

**CITY OF WOODBURN, OREGON**

***Request for Proposals***

***Library Chiller Replacement***

***DATE & TIME DUE: NOVEMBER 16, 2021 AT 2:00PM***

***SUBMIT PROPOSAL TO CITY OF WOODBURN:***

***City of Woodburn  
Public Works Department  
190 Garfield Street  
Woodburn, OR 97071  
503-982-5240***



**CITY OF WOODBURN  
PUBLIC WORKS DEPARTMENT  
Library Chiller Replacement  
Proposals due 2:00pm on *NOVEMBER 16, 2021*  
REQUEST FOR PROPOSALS**

The City of Woodburn is requesting proposals, from qualified firms, for providing a replacement for the library chiller.

A successful firm will be selected based upon the following criteria: 1) Qualifications to perform the scope of services; 2) Prior work experience performing the scope of services; 3) Demonstrated understanding of the scope of services required; 4) References from other communities receiving services; 5) Fee schedule for providing scope of services; and 6) Overall best value to the City.

The City of Woodburn invites firms to submit five (5) copies of the proposal outlining their experience and qualifications in performing work as described in the Scope of Services. The City will receive sealed proposals until **2:00 PM on November 16, 2021**. These should be delivered to the City of Woodburn, Public Works Department, 190 Garfield Street, Woodburn, Oregon 97071. The City will make the Solicitation Document available for viewing at the above address, by appointment only.

The City **will not accept** facsimile proposals. The City **will not accept** any proposals after the stated opening date and time. The City will return all late proposals unopened to the submitting firm. Proposers are required to certify non-discrimination in employment practices and identify resident status as defined in ORS 279A.120. Pre-qualification of proposers is not required. All proposers are required to comply with the provisions of Oregon Revised Statutes and the City of Woodburn Public Contracting Rules

The City of Woodburn reserves the right to reject any or all proposals not in compliance with public bidding procedures; to postpone award of the contract for a period not to exceed sixty (60) days from date of proposal opening; to waive informalities in the proposals; and to select the proposal that is in the best interest of the City.

This project is subject to the prevailing wages rates under the Oregon Prevailing Wages Law (BOLI). Prevailing wage rates are available at: <https://www.oregon.gov/boli/employers/Pages/prevailing-wage-rates.aspx> and listed as "Prevailing Wage Rates for Public Works Contracts in Oregon effective July 1, 2021" and "Prevailing Wage Rates Amendment Effective August 1, 2021.

A complete copy of the Request for Proposal, invitation to propose, terms and conditions and a detailed description of services required are available on line at <https://www.woodburn-or.gov/publicworks/page/bids-and-rfps> or by contacting: Woodburn Public Works Department, ATTN: Pete Gauthier, 190 Garfield Street, Woodburn, OR 97071, ph. 503-980-2429, [pete.gauthier@ci.woodburn.or.us](mailto:pete.gauthier@ci.woodburn.or.us)

Questions pertaining to this RFP should be directed to Pete Gauthier, Project Engineer at 503-980-2429, [pete.gauthier@ci.woodburn.or.us](mailto:pete.gauthier@ci.woodburn.or.us) .

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## **PART 1**

### ***OVERVIEW***

The Woodburn Public Library would like to upgrade their existing chiller with a new energy-efficient chiller and add CO<sub>2</sub> sensors to control outside air dampers. The building's HVAC system is controlled by Automated Logic WebCTRL system.

### **General Information**

The facility consists of two (2) separate buildings connected by a short-enclosed corridor. The old Carnegie Library side of the building was originally constructed in 1914 and this portion of building totals approximately 4,800 square feet. The other side of the building is the new Library which was constructed in 1977 and totals approximately 19,100 square feet for an overall 23,909 sq. ft. Heating, cooling, and ventilation are provided by a PACE air handler with a variable speed fan supplying 21 VAV boxes throughout the building. Cooling provided by a York 70 ton air cooled chiller located behind the building. Heating is provided by a natural gas heater located in the mechanical room mixed air 'plenum', as well as electric resistance reheat coils in the VAV boxes.

## **PART 2**

### ***TIMELINE***

10/11/2021 Publication of Solicitation for Proposals  
11/16/2021 Deadline for Submission of Proposals  
11/16/2021 Evaluation of Proposals  
11/22/2021 Notice of Intent to Award  
12/13/2021 Contract Award by City Council  
12/14/2021 Notice of Award  
12/15/2021 Notice to Proceed  
TBD/2022 Completion of Work

***THE CITY RESERVES THE RIGHT TO MODIFY THIS SCHEDULE AT THE CITY'S DISCRETION. ALL INTERESTED PARTIES WILL RECEIVE PROPER NOTIFICATION OF CHANGES.***

### **PART 3**

#### **SCOPE OF WORK**

This project provides professional services to address and complete the work described in EEM 1 and EEM 2 of Appendix "A", KFAA Engineering's TECHNICAL ANALYSIS STUDY City of Woodburn Library Chiller Replacement, which includes but not limited to:

1. Provide engineering support, supervision, labor, and materials.
2. Provide and replace the chiller with a new variable speed air-cooled chiller.
3. Install CO<sub>2</sub> Sensors to manage OSA damper positioning.
4. Remap BMS points and modify program as necessary
5. Perform start-up
6. Perform sequence testing of all components, adjustments as needed and verify proper operation of chiller unit and CO<sub>2</sub> sensors and dampers.
7. A separate proposal will be submitted should additional steps need to be taken and/or additional components are found defective after start-up and commissioning.

### **PART 4**

#### **PROPOSAL CONTENT**

Proposals must contain and include all information and documentation listed below:

- A. Provide five (5) copies of the proposal to the City. The proposal shall not be more than twenty (20) pages single sided printing, or ten (10) pages double sided printing in length, exclusive of the following:
  - A short cover letter
  - Executive Summary
  - Firm background information
  - Resumes of team members and personnel references
  - Timeline spread sheet
  - Fee estimate spread sheet
- B. List firm size and years in business
- C. Status as a "Resident" or "Non-Resident" bidder under ORS 279A.120 (Required form included as "Attachment B.")

- D.** Documentation of independent contractor status, (i.e., tax ID number, evidence of incorporation, legal status of entity providing service).
- E.** Completed Non-Discrimination Form: The successful submitting vendor agrees that, in performing the work called for by this proposal, and in securing and supplying materials, contractor will not discriminate against any person based on race, color, religious creed, political ideas, sex, age, marital status, physical or mental handicap. The submitting vendors must certify on the appropriate form that they have not and will not discriminate against a subcontractor or the awarding of a subcontract because the subcontractor is a minority, women, or SBE certified under ORS 200.055. (Required form included as "Attachment C.")
- F.** The submitting firm must include an Executive Summary of relevant background information and a statement indicating that the firm has the ability to complete the described project in a successful manner.
- G.** Provide a proposal section that describes the submitting firm's understanding of the scope of services sought.
- H.** Submit an estimate of billable hours to provide required work along with an estimate of total cost of the project.
- I.** List three references, preferably within the State of Oregon, which can attest to the quality and variety of services provided by your firm. Include a contact name and telephone number with each reference.
- J.** Describe your firm's pending work schedule and impacts of availability on your firm's ability to work on the project following the notice of award.
- K.** If any sub-consultants are proposed, provide a list of tasks, the names, responsibilities, and qualifications of those subconsultants.
- L.** Present an "Hourly Rate" fee proposal and total hours estimated to provide the services as defined by the scope of work.

## **PART 5**

### **EVALUATION OF PROPOSALS**

The City will make a competitive based selection, with all scores based on the evaluation criteria listed below. If the City conducts interviews, then the City will use a combination of interview scores and evaluation criteria scores to make a selection. The City will establish a committee (the "Evaluation Committee") of at least three individuals to review, score, and rank proposals according to the criteria set forth below.

#### ***Evaluation Criteria***

- A. *Qualifications of the Firm:*** The Evaluation Committee will score the proposing firm's qualifications relating specifically to their ability to complete satisfactorily the scope of services outlined in the Scope of Work. (Maximum Score is 20 Points)
- B. *Firm Qualifications and Demonstrated Accomplishments:*** The Evaluation Committee will score the demonstrated accomplishments of the proposing firm in the areas identified by the Scope of Work. (Maximum Score is 15 Points)
- C. *Demonstrated Project Understanding:*** The Evaluation Committee will score the proposing firms demonstrated understanding of the scope of services sought including a realistic equipment lead-time and estimated date of completion. (Maximum Score is 15 Points)
- D. *Organization and Staffing of Proposing Firm:*** The proposing firm must demonstrate the availability of adequate staff to perform the tasks within the allotted time schedule. The firm must provide a clear description of supervision and quality control measures implemented in the execution of a service contract. Experience of management staff and operators will be the distinguishing criteria assessed. (Maximum Score is 15 Points)
- E. *Evaluation of Fee Schedule:*** The Evaluation Committee will score the proposing firm's fee schedule including an estimate of the total billable hours. Additionally, Proposer shall provide and scoring shall take into consideration an estimated total cost as it contributes to the "best value" for the City. (Maximum Score is 35 Points)

The Evaluation Committee will rank each firm based on the sum of points awarded. The evaluation committee will base points awarded solely on the Evaluation Criteria. A maximum total score of 100 points is possible. The Evaluation Committee will establish a short list of no more than three firms following the proposal evaluation and ranking process to enter into negotiations with the Library Chiller Replacement contract.

## **PART 6**

### **SELECTION PROCESS**

The City shall use the following selection process:

- A.** Following the ranking of submitted proposal information, the Director of Public Works or his designee will join at least two members of the Evaluation Committee and become the “Selection Committee.”
- B.** The Selection Committee, at its sole discretion, may choose to interview short-listed firms prior to making their final recommendation.
- C.** The Selection Committee shall engage in negotiations whose objective shall be obtaining written agreement on:
  - Firm’s performance obligations and performance schedule
  - Compensation to the Firm for services outlined in the Scope of Work
  - The City will make its own determination concerning the fairness and reasonability of the fee proposed by the Firm.
- D.** If negotiations with the highest-ranking proposer fail to proceed to agreement on Contract terms, the Selection Committee will formally terminate negotiations with that candidate and begin negotiations with another candidate.
- E.** The Selection Committee will submit its final recommendation to the City Council for formal approval.
- F.** The City will give The Notice of Intent to Award.
- G.** The City Council will award the contract.
- H.** The City and the Firm will enter into an agreement for the work.

## **PART 7**

### **SUBMITTAL REQUIREMENTS**

The City must receive proposals no later than **2:00 p.m. on November 16, 2021**. The City **will return** proposals received after this deadline, unopened, to the proposer. The City **will not** accept faxed or emailed proposals.

- A. Proposal:** The proposer will deliver an unbound original and five complete copies of the Proposal to the address shown below. The 190 Garfield Street building is currently closed due to the pandemic. Please contact PW Engineering staff to ensure that someone will be available to receive your proposal submission. Please contact either Pete Gauthier at 503.980.2429, Dago Garcia at 503.982.5248, George Kuznetsov at 503.710.7007, Eric Liljequist at 503.982.5241 or Brenda Reiner at 503.982.5249.
- B. Cover Letter:** A Cover Letter shall accompany the proposal and it shall state that the proposer accepts all terms and conditions contained in the Request for Proposals and the sample Professional Services Contract (attached). A legal representative of the proposer, authorized to bind the firm in contractual matters, must sign the cover letter.

**C. Submit one electronic copy on disk, PDF format**

Direct all correspondence pertaining to this RFP to:

City of Woodburn  
Woodburn Public Library  
Eric Liljequist, Public Works Projects & Engineering Director  
190 Garfield Street  
Woodburn, OR 97071

Phone: 503-982-5241  
FAX: 503-982-5242  
E-mail: [eric.liljequist@ci.woodburn.or.us](mailto:eric.liljequist@ci.woodburn.or.us)

## **PART 8**

### **OTHER REQUIREMENTS**

#### ***A. Proposal Acceptance:***

- Proposal shall be legally binding as an offer for a period of 60 days after the closing date. If the City has not accepted a submitting firm's proposal within sixty-(60) days from the RFP closing date, then the firm may withdraw its proposal. The contents of the Proposal will become a contractual obligation upon acceptance by the City.

#### ***B. Public Records:***

- All Proposals shall become the property of the City and are public records unless otherwise specified. A bid that contains any information considered a trade secret under ORS 192.501(2) shall be segregated and clearly identified as such. This information shall not be disclosed except in accordance with the Oregon Public Records Law, ORS 192.

#### ***C. Clarification of Proposals***

- The City reserves the right to obtain clarification of any point in a firm's proposal or to obtain additional information necessary to properly evaluate a particular proposal. Failure of a Proposer to respond to such a request for additional information or clarification could result in rejection of the firm's proposal.

#### ***D. Form of Agreement***

- A copy of the standard Personal Service Agreement, which the City expects the successful firm or individual to execute, is included as "Attachment A." The agreement will incorporate the terms and conditions from this RFP document and the submitted proposal.

#### ***E. Proposal Rejection***

- The City reserves the right:
  - To reject any or all proposals not in compliance with all public procedures and requirements:
  - To reject any proposal not meeting the specifications set forth herein:
  - To waive any or all irregularities in proposals submitted;
  - To reject all proposals:
  - To award any or all parts of any proposal; and
  - To request references and other data to determine responsiveness

#### ***F. Protest Process***

- Protests to this RFP must be in writing and must be submitted in the form and manner prescribed by the Oregon Attorney General's Public Contracting Rules and the City of Woodburn Public Contracting Rules.

**PERSONAL SERVICES AGREEMENT  
AQUATIC CENTER DX RECOVERY REPAIR SERVICES  
(SAMPLE)**

**THIS AGREEMENT** is made and entered into as of the date first indicated on the signature page, by and between the City of Woodburn, an Oregon municipal corporation (hereinafter referred to as "CITY"), and \_\_\_\_\_, a \_\_\_\_\_ (hereinafter referred to as "CONTRACTOR").

**WHEREAS**, CITY needs certain professional personal services; and

**WHEREAS**, CITY wants to engage CONTRACTOR to provide these services by reason of its qualifications and experience; and

**WHEREAS**, CONTRACTOR has offered to provide the required services on the terms and in the manner set forth herein,

**NOW, THEREFORE**, IT IS AGREED as follows:

**SECTION 1 – SCOPE OF SERVICES**

The Scope of Work to be performed by CONTRACTOR under this Agreement is described in Exhibit A, which is attached to this Agreement. Additionally, CONTRACTOR's proposal in response to CITY's RFP is incorporated by reference as part of this Agreement as if fully set forth.

**SECTION 2 – DUTIES OF CONTRACTOR**

- A. CONTRACTOR shall be responsible for the professional quality, technical accuracy and coordination of all work furnished by CONTRACTOR under this Agreement. CONTRACTOR shall, without additional compensation, correct or revise any errors or deficiencies in its work.
- B. CONTRACTOR represents that it is qualified to furnish the services described in this Agreement.
- C. CONTRACTOR shall be responsible for employing or engaging all persons necessary to perform its services.
- D. It is understood that \_\_\_\_\_ will be designated by CONTRACTOR as the person providing services to CITY under this Agreement and that this designated person shall not be replaced without CITY's approval.

### **SECTION 3 – DUTIES OF CITY**

- A. CITY shall provide CONTRACTOR the pertinent information regarding CITY's requirements for the Project.
- B. CITY shall examine documents submitted by CONTRACTOR and shall render decisions promptly, to avoid unreasonable delay in the progress of CONTRACTOR'S work.
- C. CITY certifies that sufficient funds are available and authorized for expenditure to finance costs of this Agreement.
- D. The contact person on the Project for CITY is designated as Josh Udermann, Aquatics Supervisor or his designee. CITY shall provide written notice to CONTRACTOR if CITY changes its contact person.

### **SECTION 4 – TERM**

The services to be performed under this Agreement shall commence upon execution of the Agreement by both parties and be completed on or before \_\_\_\_\_ and shall terminate , 2022. Upon agreement of both parties.

### **SECTION 5 – PAYMENT**

Payment shall be made by CITY to CONTRACTOR only for services rendered and upon submission of a payment request and CITY approval of the work performed, in consideration for the full performance of the services set forth in **Exhibit A**, CITY agrees to pay CONTRACTOR a fee not to exceed \$\_\_\_\_\_. Compensation shall be only for actual services provided based on the negotiated price of \$\_\_\_\_\_ for all work specified in **Exhibit A**. Payment shall not be considered acceptance or approval of any work or waiver of any defects therein by the CITY.

### **SECTION 6 – TERMINATION**

Without limitation to such rights or remedies as CITY shall otherwise have by law, CITY shall have the right to terminate this Agreement or suspend work on the DX recovery repair Services for any reason upon ten (10) days' written notice to CONTRACTOR. CONTRACTOR agrees to cease all work under this Agreement upon receipt of said written notice.

### **SECTION 7 – OWNERSHIP OF DOCUMENTS**

All documents prepared by CONTRACTOR in the performance of this Agreement, although instruments of personal service, are and shall be the property of CITY.

## **SECTION 8 – CONFIDENTIALITY**

All reports and documents prepared by CONTRACTOR in connection with the performance of this Agreement shall be considered as confidential by CONTRACTOR until they are released by CITY to the public. CONTRACTOR shall not make any such documents or information available to any individual or organization not employed by CONTRACTOR or CITY without the written consent of CITY before any such release.

## **SECTION 9 – INTEREST OF CONTRACTOR**

CONTRACTOR covenants that it presently has no interest, and shall not acquire any interest, direct or indirect, financial or otherwise, which would conflict in any manner or degree with the performance of the services under this Agreement.

## **SECTION 10 – CONTRACTOR'S STATUS**

It is expressly agreed that in the performance of the personal services required under this Agreement, CONTRACTOR shall at all times be considered an independent contractor, under control of CITY as to the result of the work but not the means by which the result is accomplished. Nothing herein shall be construed to make CONTRACTOR an agent or employee of CITY while providing services under this Agreement.

## **Section 11 – INDEMNITY**

CONTRACTOR agrees to hold harmless and indemnify CITY, its officers and employees from and against any and all claims, loss, liability, damage, and expense arising from the negligent, or claimed negligent, performance of this Agreement by CONTRACTOR, its officers or employees. CONTRACTOR agrees to defend CITY, its officers or employees against any such claims. This provision does not apply to claims, loss, liability or damage or expense arising from the sole negligence, or willful misconduct, of CITY.

## **SECTION 12 – INSURANCE**

CONTRACTOR shall provide and maintain:

- A. Commercial General Liability Insurance, occurrence form, with a limit of not less than \$1,000,000 for each occurrence.
- B. Automobile Liability Insurance, occurrence form, with a limit of not less than \$1,000,000 for each occurrence. Such insurance shall include coverage for owned, hired, and non-owned automobiles.
- C. Workers Compensation in at least the minimum statutory limits.
- D. All insurance shall:

## ATTACHMENT "A".

1. Include CITY as an additional insured with respect to this Agreement and the performance of services in this Agreement.
2. Be primary with respect to any other insurance or self-insurance programs of CITY.
3. Be evidenced, prior to commencement of services, by properly executed policy endorsements in addition to a certificate of insurance provided to CITY.
4. No changes in insurance may be made without the written approval of CITY.

### **SECTION 13 – NONASSIGNABILITY**

Both parties recognize that this Agreement is for the personal services of CONTRACTOR and cannot be transferred, assigned, or subcontracted by CONTRACTOR without the prior written consent of CITY.

### **SECTION 14 – RELIANCE UPON PROFESSIONAL SKILL OF CONTRACTOR**

It is mutually understood and agreed by and between the parties hereto that CONTRACTOR is skilled in the professional calling necessary to perform the work agreed to be done under this Agreement and that CITY relies upon the skill of CONTRACTOR to do and perform the work in the most skillful manner, and CONTRACTOR agrees to perform the work. The acceptance of CONTRACTOR'S work by CITY does not operate as a release of CONTRACTOR from said obligation.

### **SECTION 15 – WAIVERS**

The waiver by either party of any breach or violation of any term, covenant, or condition of this Agreement or of any provisions of any ordinance or law shall not be deemed to be a waiver of such term, covenant, condition, ordinance or law or of any subsequent breach or violation of same or of any other term, covenant, condition, ordinance or law or of any subsequent breach or violation of the same or of any other term, condition, ordinance, or law. The subsequent acceptance by either party of any fee or other money, which may become due hereunder, shall not be deemed to be a waiver of any preceding breach or violation by the other party of any term, covenant, or condition of this Agreement of any applicable law or ordinance.

### **SECTION 16 – STATE PUBLIC CONTRACT PROVISIONS**

All requirements of ORS Chapters 279A, 279B, and 279C including but not limited to the following, as applicable, are incorporated herein by reference.

ATTACHMENT "A".

- A. If Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished by any person in connection with this Contract as such claim becomes due, City may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due Contractor by reason of the Contract. The payment of a claim in the manner authorized above shall not relieve the Contractor or its surety from its obligation with respect to any unpaid claims.
- B. Contractor and its subcontractors, if any, are subject to Oregon Workers' Compensation Law, which requires all employers that employ subject workers who work under this Contract in the State of Oregon to comply with ORS 656.017 and provide the required workers' compensation coverage, unless such employers are exempt under ORS 656.126. Contractor shall ensure that each of its subcontractors, if any, complies with these requirements.
- C. Contractor shall, upon demand, furnish to the City, written proof of workers' compensation insurance coverage. Contractor is required to submit written notice to the City thirty (30) days prior to cancellation of said coverage.
- D. Contractor shall use recyclable products to the maximum extent economically feasible in the performance of the contract.
- E. Contractor is engaged as an independent contractor and will be responsible for any federal or state taxes applicable to any payments made under this Contract.
- F. Contractor agrees and certifies that it is a corporation in good standing and licensed to do business in the State of Oregon. Contractor agrees and certifies that it has complied and will continue to comply with all Oregon laws relating to the performance of Contractor's obligations under this Contract.
- G. Contractor shall:
  - G.1 Make payment promptly, as due, to all persons supplying to the Contractor labor and material for the prosecution of the work provided for in the contract documents;
  - G.2 Pay all contributions or amounts due to the State Accident Insurance Fund incurred in the performance of this Contract;
  - G.3 Not permit any lien or claim to be filed or prosecuted against the City on account of any labor or material furnished; and
  - G.4 Pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

ATTACHMENT "A".

- H. The Contractor shall promptly as due, make payment to any person, co-partnership or association or corporation furnishing medical, surgical and hospital care or other needed care and attention, incident to sickness or injury, to the employee of such Contractor, of all sums which the Contractor agrees to pay for such services and all moneys and sums which the Contractor collected or deducted from the wages of employees pursuant to any law, contract or Agreement for the purpose of providing or paying for such service.
- I. The CONTRACTOR shall pay employees for overtime work performed under the contract in accordance with ORS 653.010 to 653.261 and the Fair Labor Standards Act of 1938 (29USC201 et. seq.).
- J. An employer must give notice to employees who work on a contract for services in writing, either at the time of hire or before commencement of work on the contract, or by posting a notice in a location frequented by employees, of the number of hours per day and days per week that the employees may be required to work.
- K. Contractor will comply with 279.835 et seq. in the procurement of products and services from a nonprofit agency for disabled individuals.

**SECTION 17 – ATTORNEY FEES**

In the event a suit or action is instituted to enforce any right guaranteed pursuant to this Agreement, the prevailing party shall be entitled to, in addition to the statutory costs and disbursements, reasonable attorney fees to be fixed by the trial and appellate courts respectively.

**SECTION 18 – NOTICES**

All notices hereunder shall be given in writing and mailed, postage prepaid, addressed as follows:

TO CITY:

TO CONTRACTOR:

City of Woodburn  
Library Manager  
Mike Jansen  
280 Garfield St.  
Woodburn, OR 97071

**SECTION 19 – AGREEMENT CONTAINS ALL UNDERSTANDINGS; AMENDMENT**

ATTACHMENT "A".

This document represents the entire and integrated Agreement between CITY and CONTRACTOR and supersedes all prior negotiations, representations, and agreements, either written or oral.

This document may be amended only by written instrument, signed by both CITY and CONTRACTOR

**SECTION 20 – GOVERNING LAW**

This Agreement shall be governed by the laws of the State of Oregon.

IN WITNESS WHEREOF, CITY and CONTRACTOR have executed this Agreement the day and year written.

**CITY OF WOODBURN:**

**CONTRACTOR:**

By: \_\_\_\_\_  
City Administrator

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

ATTACHMENT "B"

**BIDDER/PROPOSER RESIDENCY STATEMENT**

Pursuant to ORS 279A.120, Oregon's Reciprocal Preference Law, public contracting agencies shall, for the purposes of determining the lowest responsible bidder/proposer and the awarding of a contract, add a percent increase on the bid of a non-resident bidder/proposer equal to the percent, if any, of the preference given to that bidder/proposer in the state in which the bidder/proposer resides.

As defined in ORS 279A.120, "Resident Bidder/proposer" means a bidder/proposer that has paid unemployment taxes or income taxes in this state in the twelve calendar months immediately preceding submission of the bid, has a business address in this state, and has stated in the bid whether the bidder/proposer is a "Resident Bidder/proposer". A "Non-resident Bidder/proposer" is a bidder/proposer who does not meet the definition of a "Resident Bidder/proposer" as stated above.

1. Bidder/Proposer ☐ IS ☐ IS NOT a "Resident Bidder/proposer" as set forth above.

2. If a Resident Bidder/Proposer, enter your Oregon Business address below:

---

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3. If a Non-resident Bidder/Proposer, enter state of residency:

---

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Bidder/Proposer hereby certifies that the information provided is true and accurate.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed or Typed Name: \_\_\_\_\_

Title: \_\_\_\_\_

Firm: \_\_\_\_\_

Telephone: \_\_\_\_\_

**CERTIFICATE OF NON-DISCRIMINATION**

Pursuant to ORS 279A.110, discrimination in subcontracting is prohibited. Any contractor who contracts with a public contracting agency shall not discriminate against minority, women or emerging small business enterprises in the awarding of contracts.

By signature of the authorized representative of the bidder/proposer, the bidder/proposer hereby certifies to the City of Woodburn that this bidder/proposer has not discriminated against minority, women, or emerging small business enterprises in obtaining any subcontracts; and, further, that if awarded the contract for which this bid or proposal is submitted, shall not so discriminate.

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Printed or Typed Name: \_\_\_\_\_

Name of Firm: \_\_\_\_\_

# Appendix “A”

KFAA Engineering

## TECHNICAL ANALYSIS STUDY

City of Woodburn  
Library Chiller Replacement

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# TECHNICAL ANALYSIS STUDY

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City of Woodburn

Library Chiller Replacement

280 Garfield St., Woodburn, OR 97071

**Project: ETECP51545322046**



*SPONSORED BY:*

ENERGY TRUST OF OREGON – EXISTING BUILDINGS  
PROGRAM

*SERVING UTILITIES:*

Portland General Electric and Northwest Natural Gas

*SUBMITTED BY:*

KARL FRIESEN AND ASSOCIATES, LLC DBA KFAA  
ENGINEERING

March 5, 2021

Version 1

## CONTACTS

### Site Contact

The following facility personnel assisted with this report:

John Hunter, Facilities Supervisor  
280 Garfield St  
Woodburn, OR 97071  
503-982-5259  
[John.Hunter@ci.woodburn.or.us](mailto:John.Hunter@ci.woodburn.or.us)

### Energy Trust Contact

Nikki Burton  
*Account Manager, Existing Buildings*  
ICF International  
615 SW Alder St, Suite 200  
Portland, OR 97205  
503.351.3712  
[Nikki.Burton@icf.com](mailto:Nikki.Burton@icf.com)

### ATAC Contact Information

The Allied Technical Assistance Contractor (ATAC) that prepared this report is:

Karl Friesen, PE, and Tony Zagelow  
Karl Friesen and Associates, LLC dba KFAA Engineering  
quest  
503.686.1176  
[www.karlfriesen.com](http://www.karlfriesen.com)

## DISCLAIMER

*In no event will Energy Trust of Oregon, Inc. or ATAC be liable for (i) the failure of the customer to achieve the estimated energy savings or any other estimated benefits included herein, or (ii) for any damages to the customer's site, including but not limited to any incidental or consequential damages of any kind, in connection with this report or the installation of any identified energy efficiency measures. The intent of this energy analysis study is to estimate energy savings associated with recommended energy efficiency upgrades. This report is not intended to serve as a detailed engineering design document, any description of proposed improvements that may be diagrammatic in nature are for documenting the basis of cost and savings estimates for potential energy efficiency measures only. Detailed design efforts may be required by participants to implement potential measures reviewed as part of this energy analysis. While the recommendations in this report have been reviewed for technical accuracy and are believed to be reasonably accurate, all findings listed are estimates only, as actual savings and incentives may vary based on final installed measures and costs, actual operating hours, energy rates, and usage.*

## NEXT STEPS FOR THE PARTICIPANT

### APPLY FOR ENERGY TRUST INCENTIVES

***Make an implementation decision:*** Please evaluate the information contained in this report and any potential measures and incentives listed in the Form 110C – Project Detail and Incentive Estimates (produced by ICF). Have your contractors bid for the measure(s) you wish to implement and send ICF a copy of the final bid. ICF will review your contractor's proposed scope to determine compliance with the Existing Building's requirements and the energy efficiency measures as described in this report. After it is determined by ICF that the project bid specifications match the studied measure, Form 120C – Incentive Application will be provided for you to review. If you apply for Energy Trust incentives for your project, your signed Form 120 C - Incentive Application must be provided to ICF BEFORE you issue purchase orders or make other financial commitments to begin the project work.

***Upon completion of the Project:*** ICF must be notified once the project is completed to arrange a post-installation verification for projects that receive incentives greater than \$5,000. The program must receive all required documentation and perform any required post-installation verifications before incentives can be issued.

### APPLY FOR ENERGY TRUST SOLAR INCENTIVES

***Make a solar implementation decision:*** Please evaluate the solar site evaluation (SSE), if included in this report. Your PMC will arrange a meeting to discuss the results of the evaluation. Or, if you wish to move forward, your PMC will provide you with a list of qualified Trade Ally contractors. Obtain bids on the solar measures you want to implement. When you have selected a solar Trade Ally contractor for the installation, the Trade Ally will provide and submit the necessary incentive application paperwork to Energy Trust on your behalf. The PMC and Energy Trust's solar staff are available to answer all your solar questions.

***Upon completion of the Solar Project:*** The solar Trade Ally will arrange for the final Energy Trust verifications, and within 30 days of successful verification, you will receive your solar incentive check from Energy Trust.

## EXECUTIVE SUMMARY

This report evaluates, for the City of Woodburn Library, located at 280 Garfield St, Woodburn, Oregon, an upgrade of their existing chiller with a new energy-efficient chiller. Plus identifies ways to use this chiller more efficiently through operational changes, to take advantage of this new chiller's variable speed and control capabilities. These improvements were identified via discussions with the facility lead and their HVAC service provider, as well as from initial and follow-up walkthroughs. These steps included occupant conversations and the placement of data loggers to collect operational data on the HVAC system.

The facility consists of two (2) separate buildings connected by a short-enclosed corridor. The old Carnegie Library side of the building was originally constructed in 1914 as part of Andrew Carnegie's nationwide library project that constructed over 35 similar type structures built between 1883 and 1929. This portion of building totals approximately 4,800 square feet. The other side of the building is the new Library which was constructed in 1977 and totals approximately 19,100 square feet for an overall 23,909 sqft. Heating, cooling, and ventilation are provided by a PACE air handler with a variable speed fan supplying VAV boxes throughout the building. Cooling provided by a York 70 ton air cooled chiller located behind the building. Heating is provided by a natural gas heater located in the mechanical room mixed air 'plenum', as well as electric resistance reheat coils in the VAV boxes.

Using data from the last three years, the annual average 3,064 therms and electricity usage 268,592 kWh

Projected current EUI = 51.2

Total % savings for electricity = 25%

The area affected by measures: 100% of the Bldg.

Total % savings for therms = 11%

## ENERGY EFFICIENCY MEASURE SUMMARY

EEM 1 – Chiller replacement

EEM 2- DDC controls optimization and CO<sub>2</sub> sensors

**Table 1: EEM Summary Table**

EEM #	Estimate Electric Savings (kwh)	Estimate Gas Savings (therms)	Estimated Energy Cost Savings (\$) *	Estimated Non-Energy Benefits (\$) **	Estimated Installation Costs \$	Estimated Simple Payback ***	Estimated Return on Investment (ROI) ****
EEM # 1	40,040	292	\$ 3,342	\$ 7,182	\$ 101,704	9.7	10%
EEM # 2	27,400	37	\$ 2,165		\$ 8,080	3.7	27%

Notes:

- \* Cost savings are based on Energy Trust average utility rates of \$0.078/kWh and \$0.75/therm for Oregon and \$0.792/therm for Washington in payback calculations. Actual participant rates may be different.
- \*\* Non-energy cost benefits are from items such as avoided maintenance, reduced water costs, or other cost savings.
- \*\*\* Simple Payback is a measure of how quickly your investment in the measure will pay for itself.
- \*\*\*\* Simple ROI is another measure of the measure's benefits. This is simply the inverse of the Simple Payback and can be used as a rough comparison to other investment opportunities.

**HISTORICAL ENERGY USE**  
**TABLE 2 : HISTORICAL BUILDING ENERGY USE**

<b>Average Utility Billing Analysis for City of Woodburn - Library - Chiller</b>								
	Electric Use (kWh)				Natural Gas Use (therms)			
	2017	2018	2019	3 Year Average	2017	2018	2019	3 Year Average
Jan	27,499	23,166	35,573	28,746	577	635	348	520
Feb	24,452	23,147	40,460	29,353	613	624	553	597
Mar	29,396	21,962	30,806	27,388	119	525	340	328
Apr	19,686	5,426	19,465	19,575	2	312	163	238
May	13,984	5,607	17,429	15,707	157	112	55	108
Jun	890	5,906	16,050	16,050	86	69	21	59
Jul	18,882	20,470	17,471	18,941	21	19	4	14
Aug	19,895	19,390	18,569	19,284	10	8	1	6
Sep	17,608	19,800	16,501	17,970	88	0	50	46
Oct	19,455	24,469	19,752	21,225	285	0	233	173
Nov	20,243	27,871	24,916	24,343	524	155	496	392
Dec	28,455	33,067	28,505	30,009	864	321	567	584
TOTAL				268,592				3,064
TOTAL ENERGY USE IN KBTU				1,223,418				
ENERGY USE INDEX (KBTU/SQ.FT./YR)				51.2				

THE MONTHS HIGHLIGHTED IN BLUE ARE 2020 DATA. THE MONTHS HIGHLIGHTED IN RED ARE OUTLIERS AND HIGH/LOW DUE TO FAULTY METER OR READING ERROR AND ARE EXCLUDED FROM THE AVERAGE CALCULATIONS.

NOTE: THE EUI FOR THIS BUILDING 51.2 KBTU/SQFT/YR IS 28% MORE THAN THE NATIONAL AVERAGE ENERGY USE PER SQUARE FOOT FOR A BUILDING OF THIS TYPE, 71.6 KBTU/SQFT/YR ACCORDING TO USDOE ENERGY STAR RATINGS.

## FACILITY OVERVIEW

### FACILITY DESCRIPTION

The facility operates as the City library for the City of Woodburn. The facility consists of two (2) separate buildings connected by a short-enclosed corridor.

#### Carnegie Library

This part of the facility was originally constructed in 1914 as part of Andrew Carnegie's library project that constructed over 35 similar type structures built between 1883 and 1929. It is a rectangle-shaped building on the north end of the site and totals approximately 4,800 square feet.

#### New Library

This part of the facility was originally constructed in 1977. Its basic footprint is rectangular with protruding architectural features on its east facade. Its longest orientation runs north/south and totals approximately 19,100 square feet.

Total approximate square footage of both buildings: 23,909

The building's occupancy is approximately six to eight hundred (600-800) visitors daily with three (3) to five (5) staff working daily.

The libraries hours of operation include:

Saturday & Sunday Closed

Monday & Tuesday Noon-7pm

Wednesday, Thursday & Friday 10 am- 5 pm

The building tightness is average for structures of their age and construction.

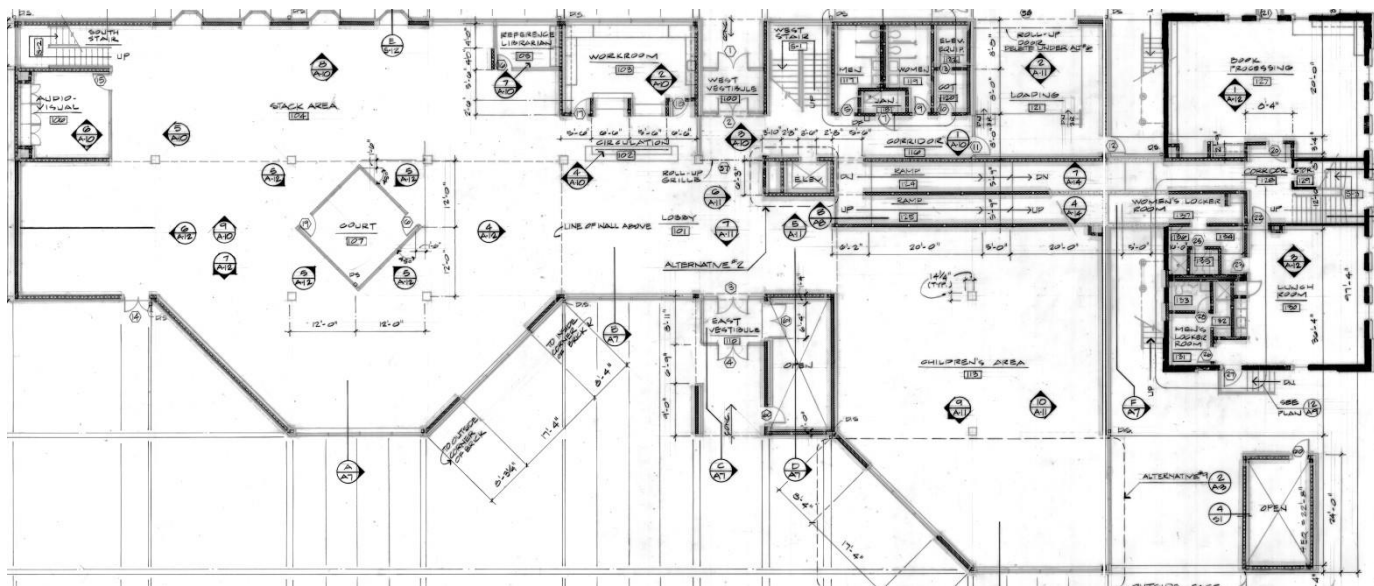


Image 1: Ground Level

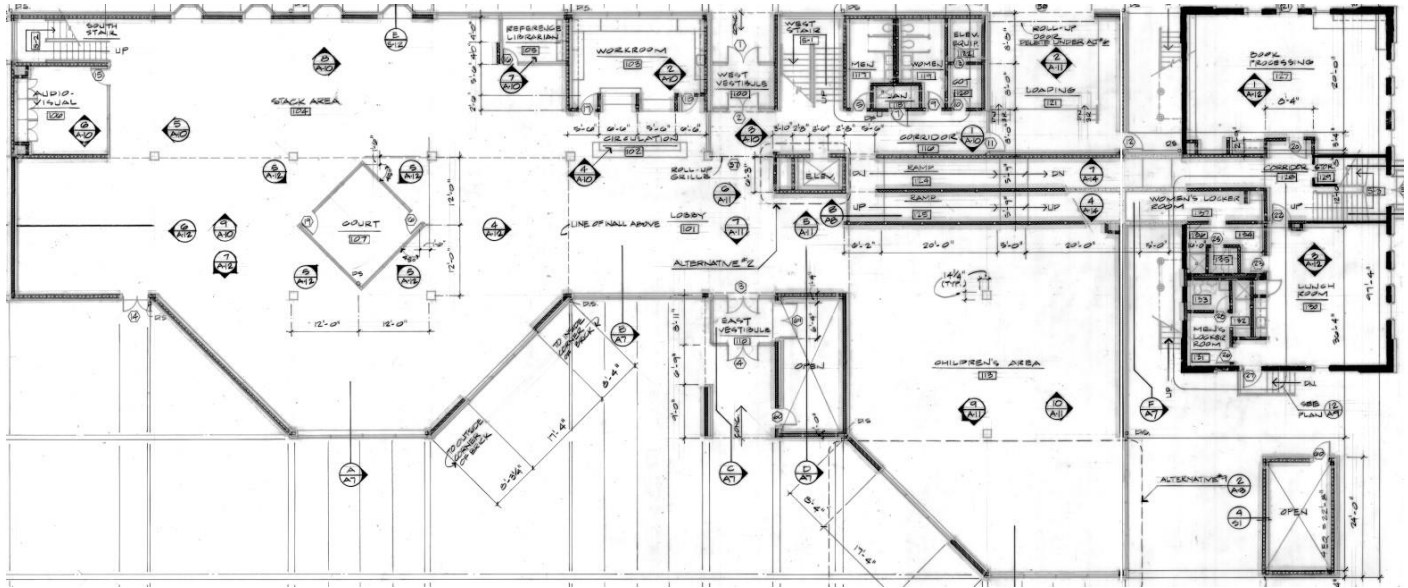


Image 2: Upper Level

### Walls

#### Carnegie Library

External walls are constructed of white brick masonry over 10" concrete with furred insulation (R-13)  
(R-Value=13.03, U-Factor=0.077)

#### New Library

1<sup>st</sup> Level: External walls are wood frame construction with red brick masonry over ½" fiberboard sheathing and batt insulation (R-19). (R-Value=17.68, U-Factor=0.057)

2<sup>nd</sup> Level: External walls are wood frame construction with blue galvanized finish over ½" fiberboard sheathing and batt insulation (R-19). (R-Value=17.25, U-Factor=0.058)

### Roof

#### Carnegie Library

The roof construction is an advanced wood frame, 24" o.c. with a built-up style roof finish. (R-Value=2.25, U-Factor=0.444)

#### New Library

The roof construction is an advanced wood frame, 24" o.c. with steel galvanized blue roofing w/ batt insulation (R-30). (R-Value=30.1, U-Factor=0.033)

### Floors

#### Carnegie & New Library

Both buildings have floors that are 6" concrete throughout with carpeting in a few areas.

### Doors

### Carnegie Library

The building's main entrance is located on its west façade and consists of one (1) set of double 7'x6' wood and glass doors. that lead into the 1<sup>st</sup>-floor main lobby. The east and west north façade have one (1) 2'x7'wood and glass doors each. All doors single doors windows are single pane clear glass (U=1.11, SHGC=0.86).

### New Library

The building has two (2) matching entrances one located on the building's west façade and the other on its east façade. Both entrances have air-lock style doors consisting of two sets of 7'x6' glass and metal double doors. All doors contain double-pane clear glass (U=0.47, SHGC=0.78).

### Windows

#### Carnegie Library

The building's windows cover approximately 15% of its facades. All windows have single-pane clear glass (U=1.11, SHGC=0.86) and an aluminum frame type, without break.

#### New Library

The building's windows cover approximately 5% of its facades. All windows have double-paned tempered tinted glass (U=0.47, SHGC=0.78) and an aluminum frame type, without break.

### Internal Loads

#### Carnegie & New Library

### Lighting

The buildings have upgraded fixtures to LED but a few fluorescent fixtures still exist throughout the buildings.

### Miscellaneous Equipment

The employee breakrooms contain refrigerators and a microwave.

### Other Miscellaneous Equipment

The equipment throughout the building is common for buildings of this type. Typical office type equipment of desktop computers, laptop computers, and printers.

## **Heating, Ventilating, and Air Conditioning (HVAC)**

The building HVAC system consists of one (1) variable speed Supply Fan (SF-1) and one variable speed (1) Return Fan (RF-1) that serve the building's twenty-one (21) terminal units throughout the facility, eight (8) of which are on the 1<sup>st</sup> floor and thirteen (13) on the 2<sup>nd</sup> floor.

One (1) Cooling Coil (CC-1) is installed directly downstream from SF-1 and is served chilled water from the chiller (CH-1) via the Chilled Water Pump (CH-1).

One gas fired heaters installed in mechanical room 'mixed air plenum' provides heating to the facility (along with electric resistance reheat coils in the VAV boxes).

All equipment listed is in the building's equipment room except for the chiller and exhaust fan.

The chiller is located outside on the ground just outside the mechanical room entrance.

Supply Fan (SF-1): One (1) 23,000 CFM, 30 HP, 208/3, w/ VFD

Return Fan (RF-1): One (1) 23,000 CFM, 15 HP, 208/3, w/ VFD – Unit is interlocked with Supply Fan (SF-1)

Cooling Coil (CC-1): One (1), 23,000 CFM, 764 MBH

Chiller (CH-1): One (1) York YCAL Series 30-ton, air cooled scroll, 7414 kW - Serves Cooling Coil (CC-1)

Chilled Water Pump (P-1): 3 HP, 177 GPM, 208/3

Heater - 300/231 MBH Capacity (In/Out)

Exhaust Fan (EF-1): One (1) Bathroom Exhaust Fan, 1 HP

### **HVAC Control System**

The building's HVAC system is controlled by an Automated Logic WebCTRL system installed in 2015.

### **Domestic Hot Water**

The building's DHW is served by a 130-gallon commercial 17 kW electric water heater.

### **Solar Opportunities**

Neither the Carnegie nor New Library is a good candidate for solar. Both buildings experience considerable shade throughout the day due to nearby trees.

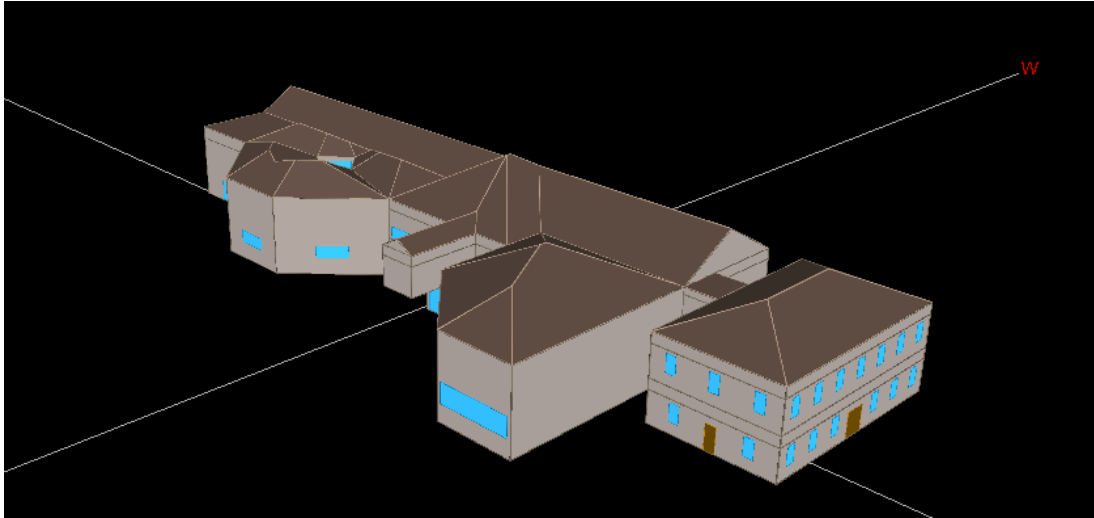
## **MODEL CALIBRATION AND METHODOLOGY**

**Table 3: Billed/Baseline versus Modeled Energy Use**

	Electric Use (kWh)			Natural Gas Use (therms)		
	Baseline	Model	% Deviation	Baseline	Model	% Deviation
Jan	28,746	30,280	5.3%	519.9	588	13.1%
Feb	29,353	23,880	-18.6%	596.6	498	-16.6%
Mar	27,388	28,560	4.3%	327.9	244	-25.7%
Apr	19,575	23,200	18.5%	237.8	222	-6.5%
May	15,707	18,240	16.1%	108.2	175	61.9%
Jun	16,050	17,400	8.4%	58.5	45	-23.6%
Jul	18,941	18,050	-4.7%	14.3	2.7	-81.2%
Aug	19,284	16,990	-11.9%	6.5	3.8	-41.2%
Sep	17,970	17,240	-4.1%	46.2	60	29.9%
Oct	21,225	21,070	-0.7%	172.6	214	24.1%
Nov	24,343	21,220	-12.8%	392.0	386	-1.5%
Dec	30,009	32,490	8.3%	584.0	625	7.1%
TOTAL	268,592	268,620	0.0%	3,064	3,063	0.0%

The initial project walkthrough was performed with the building facility supervisor, the HVAC service contractor account lead and the new chiller factory representative. Original 1977 and 2000 renovation building drawings were provided to review in follow-up correspondence. Data loggers were placed throughout the building to gain an understanding of how the building operates. The building was monitored from September 18, 2020, through October 2, 2020, including temperatures, relative humidity, light intensity, and carbon dioxide levels.

A CAD model of the building was developed and inserted into the eQuest model along with building construction and energy data, including building construction materials, architectural dimensions, and geometry - '3D' drawing below.



With all these inputs inserted into the model and changes reflected from the data loggers, the results from the energy simulation were compared with the billing data of the last 3 years provided by the ETO (both electric and natural gas consumption), so the simulation model could be calibrated.

The building's EUI is 51.2, which is 28% less than the national EUI average of 71.6 for Libraries per USDOE Energy Star ratings. Given the larger new Library portion of the building, built after the first wave of energy codes were established (versus most libraries around the country are typically much older uninsulated construction type buildings), the fairly new DDC controls/VFD fans, as well as LED lights throughout most of the building, this EUI being lower than average is understandable. However, looking at the condition/age of the chiller and some aspects of the DDC operation, there are energy savings opportunities for the building in the two areas of focus for this study. The logs identified that excess volumes of outside air are being supplied via the AHU since there are no CO<sub>2</sub> sensors integrated within the operation of the outside air control. Although the CO<sub>2</sub> logger observations are a little misleading since the building has reduced occupancy during this investigative process, because of the Covid-19 pandemic. So, expectations for outside air savings are tempered by this current situation. In addition, the logs, as well as inquiries on the DDC system remotely by KFAA, suggest that the building could benefit from a more aggressive occupied/unoccupied temperature setback regime. Lastly, although the chiller is only 19-20 years old, the operation could benefit from an upgrade to a new high-efficiency variable speed model. This report identifies how excess energy consumption can be reduced following the recommendations of this TAS process.

All model inputs attempt to reasonably represent the observed conditions and system operation following an effective modeling process. Zones within the building were modeled according to their heating/cooling system components and activity type. The building consists of library reading spaces, stacks, private office areas, conference rooms, hallways, reception and lobby areas, storage, and restrooms. The HVAC system was modeled as somewhat degraded efficiency

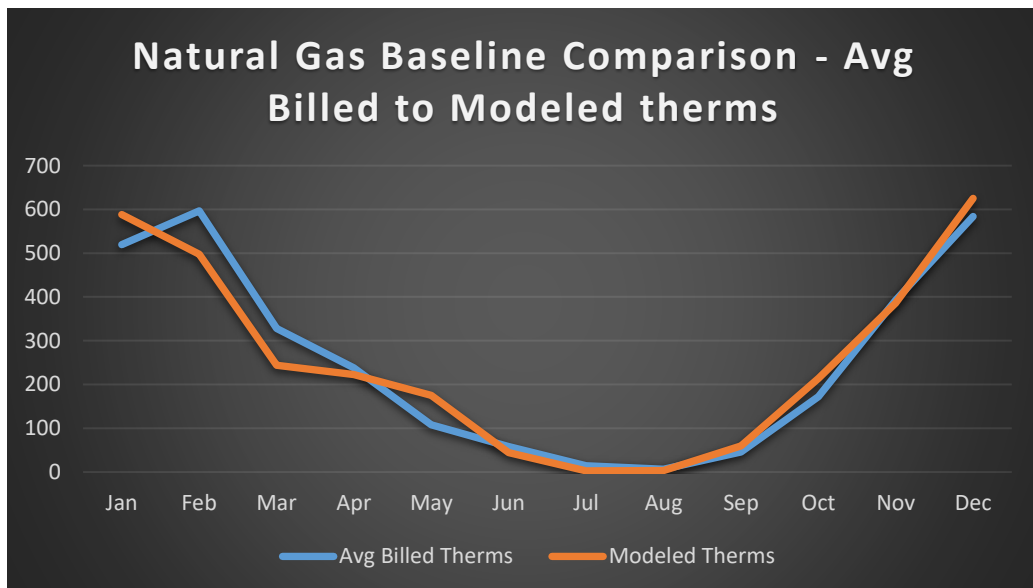
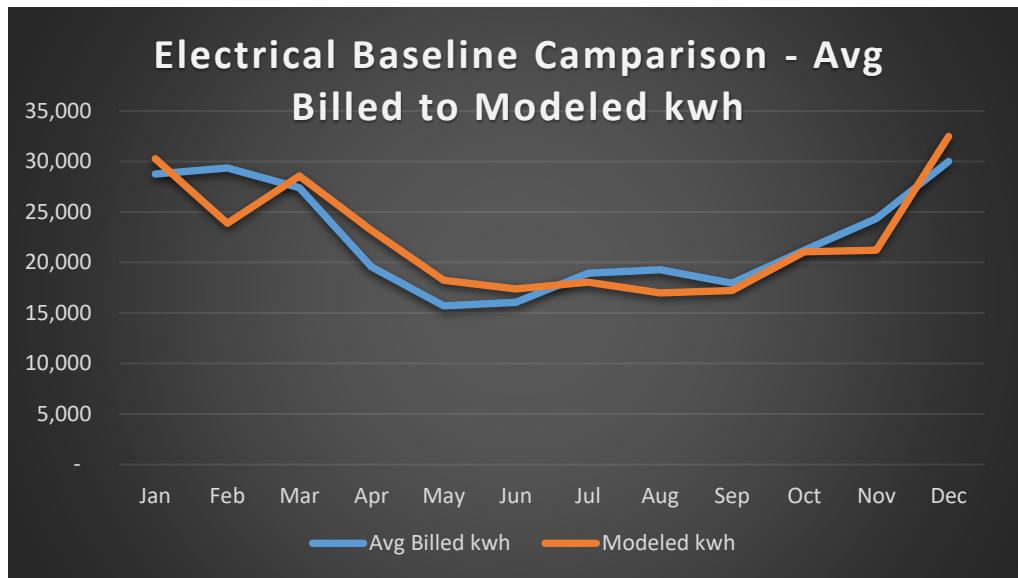
20-year-old Chiller and standard VAV system with natural gas pre-heat. Distribution boxes have electric resistance reheat.

The data logs identified that the HVAC system startup engages many hours before the occupancy and ends a couple of hours after occupancy at roughly the same time each night. This action both increases energy usage to maintain temperatures when vacant, as well as this action, reduces the mechanical room gas heater's ability to perform its morning warmup cycle (natural gas heat being a less expensive source for heating). To reflect this early during the morning situation, the fan operation was modeled to operate 6 hours before and 5 hours after occupancy (5 am to 2 am).

The building's occupancy profile was modeled from Monday through Friday from approximately 11 AM to 7 PM on Monday and Tuesday and 10 AM to 5 PM throughout the year and closed on weekends and public holidays. Although the staff occupancy extends these periods to more normal occupancy timeframes during the week. Ventilation air for the occupied areas was modeled at somewhat higher (expected design levels being the 20cfm/person, the design standard when the building's HVAC system was built) to account for the low CO2 levels observed in the data logs. The cooling and heating efficiencies were reduced slightly to account for the degradation of the system components over the many years of operation. The natural gas furnace in the mechanical room is used for pre-heating/morning warmups only, with the primary re-heat provided by the distribution box level, electric reheat coils. Since eQuest cannot model pre-heating/morning warmups with a different fuel source, a workaround was employed whereby a hot water baseboard was used to mimic the morning warmup scenario. Based on the existing usage and observed HVAC/re-heat operation starting early morning and throughout occupied hours, this operating scenario was iterated around various values to calibrate the model to the actual energy use billings.

Also, only a 'moderate' unoccupied setback regime was observed in the data logs. Plus, the data logs helped identify a specific and routine HVAC system operation that started early and ended late at night, all of which was accounted for in the model calibration processes.

**The eQuest model simulation was run and compared with the utility billing history per the below charts.**



## DETAILED DESCRIPTION OF PROPOSED MEASURES

### **EEM 1 – CHILLER REPLACEMENT**

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**KFAA Engineering** ..... **Integrated Resource Optimization Management Services**  
 1822 SW Madison Street, Suite 222  
 Portland, OR 97025

## **BASELINE CONDITION**

The existing chiller is a 70 ton, 20-year-old standard air-cooled reciprocating York chiller with nominally lower efficiencies than its original design efficiencies due to condition/age.

## **PROPOSED CONDITION**

A new variable speed McQuay air-cooled chiller. This new unit will be more much efficient and the more sophisticated onboard controls along with the variable speed capability will allow the unit to be operated with a CHW reset temperature strategy that will both reduce the energy consumption of the chiller, but also reduce the electric reheat coil operation by delivering warmer cool air during non-peak load periods.

## **NON-ENERGY SAVINGS DESCRIPTION**

The implementation of this measure will result in improved thermal comfort for occupants and improved energy usage per the above-mentioned strategies. This improved system will also reduce overall HVAC system management and maintenance costs. The NEB appendix has details on the calculation of these avoided maintenance costs included in the summary evaluation chart (Table 1).

TABLE 4: SUMMARY OF EEM1

	kWh Savings	Therm Savings
Estimated Total Energy Savings	40,040	292
Age of Equipment Being Replaced	The existing systems have been in place for 20 years,	
Is Existing Equipment Currently Working or Not Working?	Yes, but not optimally efficient	
Cost	\$101,704	
Notes	EEM savings were calculated by making appropriate adjustments to the reset temperatures, Chiller efficiency via the eQuest model to reflect the improvements mentioned.	

TABLE 5: EEM1 CONDITIONS

Item	Baseline Condition	Proposed Condition
Chiller efficiency	1.46 kW/ton Shutdown in winter	0.64 kW/ton Shutdown in winter
SAT reset	55°F at 65°F or above 58°F at 60°F or below	OA Reset 55°F at 80°F or above 65°F at 60°F or below
Morning warmups	Very low morning warmups	Optimize the gas furnaces due to optimized SAT reset. The system does not require the pre-heat as much due to lower SAT temperatures.

TABLE 6: ENERGY MODELING ASSUMPTIONS FOR THE PROPOSED EEM

Item	Baseline Condition	Proposed Condition	Justification
Chiller efficiency	1.46 kW/ton (8.21 EER) Shutdown in winter	0.64 kW/ton (18.76 EER) Shutdown in winter	The chiller efficiencies for the existing system were based on design drawings from the year 2000. The efficiencies have slightly been reduced to account for inefficiencies due to age and operation. The proposed condition efficiency is based on a new chiller with variable speed condenser fans. The efficiencies on the system range from 10.76 EER (1.1 kW/ton) at 100% load to 0.57 kW/ton (20.85 EER) at 20% load. An efficiency of 0.64 kW/ton which is obtained at 50% load was selected based on the average load observed in the modeling software for the building.
SAT reset & morning warmups	55°F at 65°F or above 58°F at 60°F or below	OA Reset 55°F at 80°F or above 65°F at 60°F or below	With an optimal reset strategy, the operational savings increased because the chiller does not have to work hard to generate lower temperatures based on outside air condition and the building load. The gas furnace use (and electric reheat coils) will also reduce because the overall supply temperatures during mild outdoor temperature will be lower thus the frequency of pre-heating the air will reduce.

## EEM 2 – DDC CONTROLS OPTIMIZATION AND CO2 SENSOR INTEGRATION

### BASELINE CONDITION

The existing HVAC DDC control system was recently upgraded in 2015 to Automated Logic WebCTRL. This reasonably new DDC control system is efficient in managing the overall operations; however, the current system has no way to control outside air based on internal demands (DCV). Several spaces were observed with multiple personal space heaters to cope in part with the system needing to heat up cooler delivered temperature air than is necessary much of the year. Some of these issues are limitations of the existing chiller compressor cycling and others are a result of excessive outside air in need of heating before delivery to the space, resulting in excess reheat needs. In addition, excess pre and post-occupancy HVAC operations were observed based on data logs.

### PROPOSED CONDITION

The existing DDC system will have CO<sub>2</sub> sensors added into key spaces to make decisions to open/close down the outside air based on these readings in order to react to occupant actual needs. This will allow for the reduction in the amount of colder (and warmer in the summer) outside air most of the year that needs to be conditioned thus reducing electric resistance reheat operation improving the building's overall energy efficiency. Also, more aggressive unoccupied temperature setbacks along with an optimal start/stop routine at the beginning and ends of the occupied periods will be implemented. This will reduce the system after hours of operation and provide more accurate and precise control of the HVAC system and operation schedule.

The implementation of improved and more efficient operating strategies will reduce the energy use of the building and the thermal comfort will be improved.

With the implementation of this measure, the building operation will be improved in several ways:

1. A significant improvement in outside air control is anticipated based on the active monitoring of CO<sub>2</sub> levels combined with verified firm control of the outside air dampers. This will minimize the amount of outside air in need of heating/cooling at all times, and will shut off completely outside air after hours when no occupants remain in the building. These should be controlled to 800-850 ppm CO<sub>2</sub> or less.
2. More aggressive unoccupied temperature setbacks will be implemented to reduce the unnecessary after-hours overall system operation, including reduced after-hours heating and cooling. The existing over-ride buttons on the existing temperatures sensors located around the building will be re-programmed to over-ride the unoccupied setpoints for an adjustable 1-2 hours when engaged. This allow for afterhours use of the HVAC system when applicable.
3. The optimal start/stop routine will be implemented to flexibly engage the HVAC system start times so the system will begin operation no earlier than needed to meet scheduled occupancy temperature needs. Plus, this system will flexibly shut down the system before or precisely no later than the occupied period. Depending on the ability of the building to

1

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hold heat/cooling, for most of the year (moderate temperature days) the heating/cooling systems can be turned off prior to the end of the occupied time period. The fans will still circulate to maintain occupant comfort but the temperatures will be allowed to ramp slowly down further reducing energy use. The optimal 'stop' feature will be programmed to allow for this prior to the end of the occupied period heating/cooling shutdown. This system response capability will make sure this setback strategy can be implemented effectively, so the HVAC system will have warmed up/cooled down the building before occupants arrive.

#### NON-ENERGY SAVINGS DESCRIPTION

The implementation of this measure will result in improved thermal comfort for occupants and improved energy (greater variable cool air and CO2 driven outside air control delivery capability) usage per the above-mentioned strategies. However, none of these potential savings have been included in this energy savings focused evaluation since much/most of this reduction is already taking place with the already upgraded DDC system 4-5 years ago.

TABLE 6: SUMMARY OF EEM2

	kWh Savings	Therm Savings
Estimated Total Energy Savings	27,400	37
Age of Equipment Being Replaced	The existing DDC system has been in place for 4.5 years.	
Is Existing Equipment Currently Working or Not Working?	Yes, but not optimally efficient	
Cost	\$8,080	
Notes	EEM savings were calculated by making appropriate adjustments to the schedules, and outside air flow rate via the eQuest model to reflect the improvements mentioned.	

TABLE 7: EEM2 CONDITIONS

Item	Baseline Condition	Proposed Condition
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Schedule	<p>Occupancy: Building weekday M, T: 11 AM to 7 PM W, Th, F: 9 AM to 5 PM Weekends: off</p> <p>HVAC system operation Winter: 5 AM to 2 AM Fall, Spring: 5 AM to 12 AM Summer: 5 AM to 10 PM</p> <p>Different run times have been set based on seasons due to the extremity of the temperatures where in winters the system needs to run more to meet up to the lower temperatures and in fall, springless than winter and so on for summer.</p>	<p>Occupancy: No change</p> <p>HVAC system: modeled 5 AM to 11 PM for all seasons, however, the optimal start/stop routine will shorten and lengthen these times based on the conditions and observed experience over time.</p>
Occupied setpoints	<p>Heating: 70°F Cooling: 72°F</p>	No Change
Unoccupied setpoints	<p>Heating: 67°F Cooling: 79°F</p>	<p>Heating: 62-63°F (Modeled at 64°F) Cooling: 82-84°F (Modeled at 82°F) be aware if the coldest (below 20-25°F) and hottest (above 95-96°F) days result in too cold or hot an indoor condition upon occupancy, rather than run the risk the facility staff potentially 'over-ride' the system potentially for an extended period, consider programming in a reset of these setpoints upwards/downwards ie 65-67°F and 79-80°F when these extremes occur.</p>
Optimal Start/Stop	None	<p>Optimal start/stop routine starts and stops the system at a different time each morning/evening based on the time needed to heat up/cool down the building over the past week to 10 days per the factory algorithms. The Chiller/Boiler will operate to match occupancy schedule 1-2 hours before and after to account for custodial staff use, occasional after hour use. Modeled at a conservative estimated pre-occupancy timeframe. Additional details in Table 6</p>
OA Rate	30 cfm/person	25 cfm/person
Fan Operation	<p>Same as HVAC system: Winter: 5 AM to 2 AM Fall, Spring: 5 AM to 12 AM Summer: 5 AM to 10 PM</p>	<p>Same as HVAC system: 5 AM to 11 PM for all seasons however the optimal start/stop routine will shorten and lengthen these times based on the conditions and observed experience over time.</p>
Demand Control Ventilation	None	Install CO2 sensors to manage OSA damper positioning.

TABLE 8: ENERGY MODELING ASSUMPTIONS FOR THE PROPOSED EEM

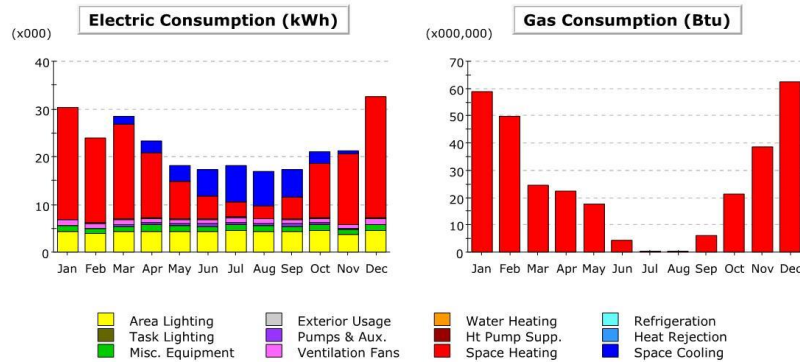
Item	Baseline Condition	Proposed Condition	Justification
Fan Operation and Optimal Start/Stop	Supply fan modeled to operate from 5 AM to 2 AM in winter and lower during fall, spring, and summer.	Supply fan modeled to operate from 5 AM to 11 PM	With an optimal start/stop routine, the fan operation is reduced every day by turning on and off closer to the projected times the S/S routine will start/stop the HVAC system for occupant comfort. Including optimally shutting off the heating and cooling (not fan operation) before the end of the occupancy period on moderate temperature days to take advantage of the building's thermal inertia (most days in Portland are moderate temperature days so depending on far the OSA (plus solar gains impacts) is off from the internal building temperature stop heating or cooling the building 1 hour, ½ an hour, 15 minutes, etc. before the end of the occupied period
Unoccupied Temperature Setback	Heating at 67 °F Cooling at 79 °F	Heating in the 62-63°F range Cooling in the 82-84 °F range – be aware if the coldest (below 20-25°F) and hottest (above 95-96°F) days result in too cold or hot an indoor condition upon occupancy, rather than run the risk the facility staff potentially 'over-ride' the system potentially for an extended period, consider programming in a reset of these setpoints upwards/downwards ie 60-61°F and 79-80°F when these extremes occur.	More aggressive setbacks for heating and cooling have been modeled for the proposed scenario to reflect the implementation of a push button in the spaces. In case of occupancy during after hours, the occupant can simply push a button and space can return to occupied temperatures within a reasonable time.  Note, that based on the range proposed as well as the value used for modeling if the owner desires to alter the set-point up to the upper range i.e. 65°F when the outside air is below said 24°F, automatically via the DDC system programming (or even higher than 65°F for a few days on a 'temporary override basis' with a DDC system automatically re-setting the system back to the desired lower setbacks during a cold spell, to keep pipes from freezing or tenants satisfied, etc., since these hours per year are so few, the 64°F modeled still value allows for this operational flexibility. Yet still will achieve the projected energy savings.
Demand Control Ventilation	none	Install CO2 sensors to manage OSA damper positioning.	The outside airflow rate defined for the baseline is derived by modeling the building at levels defined at the time of design/construction i.e. 20 cfm/person. From there the values are elevated/lowered based on the data logs which show only select period's when/select locations where the CO2 levels exceed the maximum ppm desired 800-850. So, most of the time too much outside air is being supplied. Since the existing system has no CO2 level feedback/control, there is no alteration of the outside air based on space needs. The level of OSA flow in the model is adjusted iteratively along with other known, definable variables to obtain the calibrated model results and the most correct cfm values. Too much or too little outside air and the model will not calibrate with the actual energy usage billings. Then with CO2 sensors are added to vary the OSA, but within the logical limits of the physical HVAC systems in place. I.e. older systems were not designed to allow for current code level cfm volumes. So, the upgrade values cannot go as far down as the current code suggests, without expensive air handler/ductwork and distribution box upgrade costs. So, improvements are solid but only slightly beyond the original HVAC system design intent.



# Appendix A - Equest baseline Calibrated Model

Project/Run: Woodburn Library\_111420 - Baseline Design

Run Date/Time: 11/16/20 @ 13:20



Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	1.79	2.44	3.40	5.75	7.58	7.41	5.64	2.44	0.56	-	37.02
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	23.41	17.74	19.80	13.60	7.93	4.66	3.07	2.52	4.67	11.48	14.78	25.36	149.03
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.17	0.15	0.17	0.17	0.16	0.15	0.15	0.14	0.14	0.15	0.14	0.17	1.85
Vent. Fans	1.17	0.98	0.92	0.89	0.85	0.95	1.07	0.97	0.88	0.87	0.82	1.20	11.58
Pumps & Aux.	0.04	0.04	0.42	0.41	0.43	0.44	0.47	0.47	0.44	0.42	0.17	0.04	3.78
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	1.22	1.11	1.22	1.26	1.22	1.22	1.27	1.22	1.22	1.27	1.07	1.27	14.59
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	4.26	3.85	4.24	4.42	4.24	4.24	4.45	4.26	4.24	4.43	3.67	4.45	50.76
<b>Total</b>	<b>30.28</b>	<b>23.88</b>	<b>28.56</b>	<b>23.20</b>	<b>18.24</b>	<b>17.40</b>	<b>18.05</b>	<b>16.99</b>	<b>17.24</b>	<b>21.07</b>	<b>21.22</b>	<b>32.49</b>	<b>268.62</b>

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	58.79	49.76	24.36	22.24	17.52	4.47	0.27	0.38	6.00	21.41	38.61	62.52	306.31
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>58.79</b>	<b>49.76</b>	<b>24.36</b>	<b>22.24</b>	<b>17.52</b>	<b>4.47</b>	<b>0.27</b>	<b>0.38</b>	<b>6.00</b>	<b>21.41</b>	<b>38.61</b>	<b>62.52</b>	<b>306.31</b>

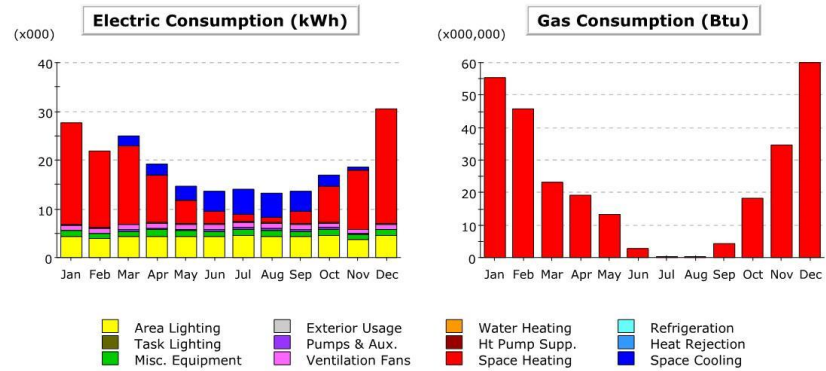
eQUEST 3.65.7175

Monthly Energy Consumption by Enduse

Page 1

Baseline Data - Various eQuest simulation outputs for each EEM are summarized and calculated below (as labeled)														
Equest Model to Billed Data Comparison Analysis - Baseline														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Electric	Avg Billed kwh	28,746	29,353	27,388	19,575	15,707	16,050	18,941	19,284	17,970	21,225	24,343	30,009	268,592
	Modeled kwh	30,280	23,880	28,560	23,200	18,240	17,400	18,050	16,990	17,240	21,070	21,220	32,490	268,620
Natural Gas	Avg Billed Therms	519.9	596.6	327.9	237.8	108.2	58.5	14.3	6.5	46.2	172.6	392.0	584.0	3,064
	Modeled Therms	587.9	497.6	243.6	222.4	175.2	44.7	2.7	3.8	60.0	214.1	386.1	625.2	3,063
From Baseline Chart Spreadsheet Tab		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Electric Data Drop from Equest		30.3	23.9	28.6	23.2	18.2	17.4	18.1	17.0	17.2	21.1	21.2	32.5	268.6
N Gas Data Drop from Equest		58.8	49.8	24.4	22.2	17.5	4.5	0.3	0.4	6.0	21.4	38.6	62.5	306.3
											51.15	Modeled Baseline EUI (kbtu/sqft)		
											51.15	Billed Energy Usage EUI Baseline		

## **Appendix B - EEM # 1 Chiller Replacement**



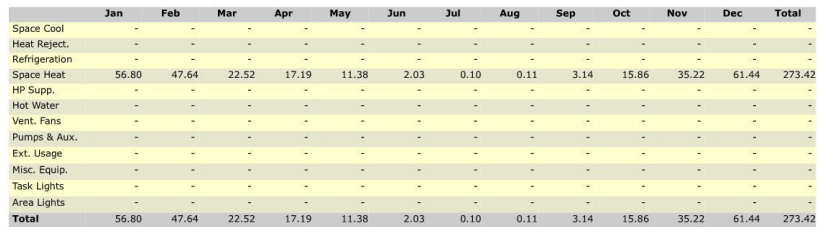
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	2.02	2.29	2.93	4.09	5.20	5.00	4.19	2.25	0.66	-	28.65
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	20.74	15.66	15.93	9.72	4.89	2.50	1.41	1.06	2.49	7.53	12.06	23.51	117.53
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.17	0.15	0.17	0.17	0.16	0.15	0.15	0.14	0.14	0.15	0.14	0.17	1.85
Vent. Fans	1.10	0.94	0.89	0.90	0.90	1.02	1.15	1.08	0.94	0.89	0.80	1.14	11.74
Pumps & Aux.	0.04	0.04	0.38	0.37	0.39	0.40	0.42	0.42	0.40	0.38	0.16	0.04	3.44
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	1.22	1.11	1.22	1.26	1.22	1.22	1.27	1.22	1.22	1.27	1.07	1.27	14.59
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	4.26	3.85	4.24	4.42	4.24	4.24	4.45	4.26	4.24	4.43	3.67	4.45	50.76
<b>Total</b>	<b>27.54</b>	<b>21.76</b>	<b>24.85</b>	<b>19.15</b>	<b>14.74</b>	<b>13.62</b>	<b>14.06</b>	<b>13.19</b>	<b>13.62</b>	<b>16.91</b>	<b>18.56</b>	<b>30.58</b>	<b>228.57</b>

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	55.31	45.80	23.24	19.09	13.42	2.85	0.18	0.23	4.33	18.14	34.59	59.96	277.14
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>55.31</b>	<b>45.80</b>	<b>23.24</b>	<b>19.09</b>	<b>13.42</b>	<b>2.85</b>	<b>0.18</b>	<b>0.23</b>	<b>4.33</b>	<b>18.14</b>	<b>34.59</b>	<b>59.96</b>	<b>277.14</b>



2

## Appendix D - Vendor Quote for Upgrades

### EEM #1 Chiller Budget Estimate

City of Woodburn - Library - Chiller				EEM Cost Estimation						
EEM # 1		Chiller Replacement								
	Materials				Labor / Gen'l			Total	Data Source/Notes	
Item Description	Qty	Unit	\$/unit	\$	Hours	\$/Hour	\$	\$		
Budget - awaiting replacement proposal not yet received as of deadline.	1	1	\$63,000	\$63,000	0	\$150	\$0	\$63,000		
Crane deployment	1	1	\$10,000	\$10,000	0	\$150	\$0	\$10,000		
Mechanical connection/replacement work (4 people for one full week)	1	1	\$1,000	\$1,000	160	\$150	\$24,000	\$25,000		
Electrical disconnection and reconnection (1 person 2 full days)	1	1	\$1,000	\$1,000	16	\$169	\$2,704	\$3,704		
Total				\$75,000				\$101,704		
Total								\$101,704		

Note - A replacement proposal is forthcoming from the contractor partner involved in the process. However, as of the due date for this TAS, it had not yet been received.

## **Appendix E – Non-Energy Benefits for EEM 1**

<b>Non-Energy Benefits</b>		
<b>Per email from John Hunter, Facility Supervisor the City has paid/will pay in 2021 - \$21,546 over the past 3 years for chiller maintenance</b>		
In-House Field Personnel		All excluding scheduled preventive maintenance
Approximate Labor Hours Per Year		
Average Hourly Rate		
Field Personnel Annual Cost	<b>\$7,182</b>	\$21,546 over 3 years
In-House Parts/Materials		All excluding scheduled preventive maintenance
Subtotal In-House	<b>\$7,182</b>	
Contractor	<b>\$0</b>	
Chemical Treatment		For boiler loops, etc.
<b>Total Avoided Costs</b>	<b>\$7,182</b>	annually
<b>Total Other</b>	<b>\$0</b>	
<b>Total All</b>	<b>\$7,182</b>	Annually

## RE: Chiller Replacement



John Hunter <John.Hunter@ci.woodburn.or.us>

To 'Karl Friesen'

Cc Theo Anderson

Date	Vendor	Description	Amount
x/x/2021	Environmental Controls	Install New TVX	\$ 2,873.00
6/24/2020	Clima-Tech	Chiller triage due to failure	\$ 1,326.75
6/24/2020	Environmental Controls	Chiller triage due to failure	\$ 1,138.25
6/24/2020	Environmental Controls	Chiller repair - mechanical	\$14,837.79
3/9/2017	Environmental Controls	Chiller repair; charge coolant.	\$ 1,370.00
			<u>\$21,545.79</u>

Regards,

**John Hunter, MLIS**

Woodburn Public Library Manager

503-982-5259

## **Appendix F – High Efficiency Chiller Cutsheet Details – EEM 1**

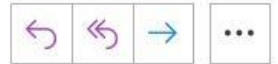
## RE: Woodburn chiller





Henry Bauer <HenryB@airreps.com>

To Theo Anderson; Karl Friesen

Cc Jeff Simons; Kurt Schultheis



Thu 1:23 PM

	SUBMITTAL_Woodburn Public Library Submittal 70 Ton Selection-Ver-1.docx 4 MB	▼
	Woodburn Public Library ALL - Schedule.xlsx 10 KB	▼

Karl, there are two options included, the enhanced selection has VFDs on the Condensing Fans.

The 10 point efficiency break out is in the attached report.

Theo will be responding with the incremental cost. Thank-you, Henry

PDC Chiller							
TAG	Model	Capacity (ton)	Input (kW)	Performance [EER] (Btu/W.h)	IPLVIP (Btu/W.h)	SCCR (KA)	Flow (gpm)
Base 70 high Eff	AGZ076E	75.3	82.91	10.90	18.03	65	180.3
Base 70 tons	AGZ076E	75.3	82.15	11.00	15.93	65	180.3

Technical Data Sheet for Base 70 tons

Job Information		Technical Data Sheet
Job Name	Woodburn Public Library	
Date	11/19/2020	
Submitted By	Henry Bauer	
Software Version	11.40	
Unit Tag	Base 70 tons	



Image may not represent ordered unit.

Unit Overview					
Model Number	Capacity ton	Voltage	Unit Starter Type	ASHRAE 90.1	LEED Enhanced Refrigerant Management Credit
AGZ076E	75.33	460 V / 60 Hz / 3 Ph	Across the Line	'07, '10, '13 & '16	Pass

Unit							
Unit Type				Platform		Unit Revision	
Air-Cooled Scroll Compressor Chiller				Packaged		0A	
Head Pressure				Tubing			
Capacitor Only (32°F Min)				Replaceable Filter Dryer with Discharge & Liquid Valves, no HGBP			
Unit Controls				Display			
Electronic Expansion Valve				On Controller only			
Refrigerant Type				Refrigerant Weight			
R410A				86 lbs (per unit)			
Pump Controls							
Dual Evaporator Pumps - Dual Control Output							
Approval							
ETL/cUL AHRI & ASHRAE 90.1							
Evaporator							
Water Volume:		5.5 gal					
Connection Hand:		Universal Connection - Facing out back					
Connection Size:		3.0 in					
Insulation:		Single Layer Insulation to Suction at each Compressor					
Entering Fluid Temperature	Leaving Fluid Temperature	Fluid Type	Fluid Flow	Fluid Flow Min / Max	Pressure Drop	Pressure Drop Min / Max	Fouling Factor
54.00 °F	44.00 °F	Water	180.3 GPM	72.3 / 301.3 GPM	10.5 ft H <sub>2</sub> O	1.80 / 28.5 ft H <sub>2</sub> O	0.000100 <sup>ft<sup>2</sup>·h/Btu</sup>
Note: Evaporator Pressure Drop does not include a strainer. Minimum flow is based on a Variable Flow Pumping System Type and applies to part load conditions only.							
Condenser							
Coil Fins:		MicroChannel					
Guards:		None					
Design Ambient Air Temperature		Altitude		Fan Diameter		Minimum Design Ambient Temperature	
95.0 °F		0.000 ft		30.0 in		32.0 °F	

Job Number: YR08G  
Job Name: Woodburn Public Library

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Prepared Date: 11/19/2020  
www.DaikinApplied.com

# Technical Data Sheet for Base 70 tons

Unit Performance											
Design											
Capacity			Input Power			Efficiency (EER)			IPLV, IP* (EER)		
75.33 tons			82.15 kW			11.00 Btu/(h·°F)			15.93 Btu/(h·°F)		
Performance Points rated at AHRI Ambient Relief											
Point #	% Load	Unit			Fluid Flow gpm <th colspan="3">Evaporator</th> <th colspan="3">Condenser</th>	Evaporator			Condenser		
		Capacity ton	Input Power kW	Efficiency (EER) Btu/(h·°F) <th>Pressure Drop ft H<sub>2</sub>O</th> <th>Entering Fluid °F</th> <th>Leaving Fluid °F</th> <th>Ambient Air °F</th> <th>Altitude ft</th>		Pressure Drop ft H <sub>2</sub> O	Entering Fluid °F	Leaving Fluid °F	Ambient Air °F	Altitude ft	
1	100.0	75.33	82.15	11.00	180.3	10.5	54.00	44.00	95.0	0.000	
2	90.0	67.79	66.41	12.25	180.3	10.5	53.00	44.00	89.0	0.000	
3	80.0	60.26	53.59	13.49	180.3	10.5	52.00	44.00	83.0	0.000	
4	70.0	52.73	43.02	14.71	180.3	10.5	51.00	44.00	77.0	0.000	
5	60.0	45.20	34.06	15.92	180.3	10.5	50.00	44.00	71.0	0.000	
6	50.0	37.66	26.72	16.91	180.3	10.5	49.00	44.00	65.0	0.000	
7	40.0	30.13	20.31	17.80	180.3	10.5	48.00	44.00	59.0	0.000	
8	30.0	22.60	14.51	18.69	180.3	10.5	47.00	44.00	55.0	0.000	
9	20.0	This load point is below the chiller minimum load.									
10	10.0	This load point is below the chiller minimum load.									
* IPLV reflects AHRI standard rating conditions with water and does not change with user defined conditions											
Sound (without insulation)											
Sound Pressure (at 30 feet)											
63 Hz dB	125 Hz dB	250 Hz dB	500 Hz dB	1 kHz dB	2 kHz dB	4 kHz dB	8 kHz dB	Overall dBA	75% Load dBA	50% Load dBA	25% Load dBA
68	68	68	62	60	54	49	44	65	64	62	61
Sound Power											
63 Hz dB	125 Hz dB	250 Hz dB	500 Hz dB	1 kHz dB	2 kHz dB	4 kHz dB	8 kHz dB	Overall dBA	75% Load dBA	50% Load dBA	25% Load dBA
95	95	95	89	87	81	76	71	92	91	89	88
Octave band is non "A" weighted and overall readings are "A" weighted. Sound data rated in accordance with AHRI Standard-370.											
Physical											
Unit											
Length*			Height			Width*			Shipping Weight*		Operating Weight*
150 in			99 in			88 in			4388 lb		4451 lb
* Shipping and operating weights do not include the weights of any Options or Accessories. Contact Chiller Applications for additional information.											

Job Number: YRR08G  
Job Name: Woodburn Public Library

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Prepared Date: 11/19/2020  
www.DaikinApplied.com

Technical Data Sheet for Base 70 tons

Electrical				
Unit Electrical Data				
Voltage	Starter Type	Fan Motor Quantity	LRA Fan Motor (each)	FLA Fan Motors (each)
460 V / 60 Hz / 3 Ph	Across the Line	6	18 A	3.6 A
Power Connection Type:	High Short Circuit Current Rating with Single Point Disconnect Switch and Circuit Protection			
Short Circuit Current Rating:	65 kA			
Single Point Power Connection				
Minimum Circuit Ampacity (MCA):	155 A			
Recommended Overcurrent Protection Size:	175 A			
Maximum Overcurrent Protection Size (MOCP):	175 A			
Lug Connection Size:	(1) 6-350MCM			
Compressor Electrical Data				
Compressor Type:	Compressor Quantity		Starter Type	
Scroll	4		Across the Line	
Circuit R:	1		2	
Compressor R:	1	3	2	4
Rated Load Amps (RLA):	30.8 A	30.8 A	26.9 A	30.8 A
Inrush Current:	229 A	229 A	173 A	229 A
Note: Power wiring connections to the chiller may be done with either copper or aluminum wiring. Wire should be sized per NEC and/or local codes. Wire sizing and wire count must fit in the power connection lug sizing listed above. Please contact your local sales office for more information.				
Options				
Electrical				
Water Flow Indicator:	Thermal Dispersion Type			
Warranty				
Unit Startup:	By Others			
Standard Warranty:	1st Year Entire Unit Parts only			
AHRI Certification				
	Certified in accordance with the AHRI Air-Cooled Water-Chilling Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Certified units may be found in the AHRI Directory at <a href="http://www.ahridirectory.org">www.ahridirectory.org</a>			

Job Number: YRROBG  
Job Name: Woodburn Public Library

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Prepared Date: 11/19/2020  
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## Appendix G – DDC Upgrade Cost Details – EEM 2

City of Woodburn - Library - Chiller		EEM Cost Estimation							
Item Description		Co2 sensor and DDC Controls upgrade							
		Materials				Labor / Gen'l		Total	Data Source/Notes
Item Description		Qty	Unit	\$/unit	\$	Hours	\$/Hour	\$	
CO2 Sensors		8	1	\$850	\$6,800	0	\$100	\$6,800	
Change occupancy, temperature setpoints, and push button override programming		1	1	\$0	\$0	8	\$160	\$1,280	
Total					\$0			\$8,080	
Total								\$8,080	

RE: [EXTERNAL]Woodburn Library questions and costs

TO Tim O'Connell <tim.oconnell@clima-tech.com>  
To 'Karl Friesen'; Kalawalaui Hosaka

Reply Reply All Forward ...  
Tue 11/17/2020 3:59 PM

Karl,

Please consider \$850 as a ROM unit price for the CO-2 sensor replacement described below. If you can bottom out on a quantity of sensors we could probably refine that but that unit cost would include a replacement combination temp/CO-2 sensor, configuring the new sensor within the existing programs, equipment graphical upgrade and programming time towards the Air Handler Economizer Operation and control drawing up-dates.

- We do have one economizer control point for the Air Handler on the controller but note that we do not have control points for individual Outside/Return/Exhaust air damper actuators.
- With regard to the unoccupied settings, we are not sure why they would be set to 66 deg. They are easily modified by the operators and you wouldn't need our involvement to get them adjusted
- We would need to get into the control programs to see how they are using the optimal start operations

Tim O'Connell  
Estimating/Sales  
(503) 710-2420 cell



RE: [EXTERNAL]If you can, .....

TO Tim O'Connell <tim.oconnell@clima-tech.com>  
To 'Karl Friesen'  
Cc Kalawalaui Hosaka

You replied to this message on 11/20/2020 1:15 PM.

Karl,

Verifying the afterhours operation can be done remotely, and since the City of Woodburn has a Clima-Tech support agreement, we would not charge them unless we have to go out on site.

This assumes that the programming is in place (which is probably the case). I'll try to connect to that site to see what's in place currently.

Tim O'Connell  
Estimating/Sales  
(503) 710-2420 cell



RE: [EXTERNAL]If you can, .....



Tim O'Connell <tim.oconnell@clima-tech.com>  
To: 'Karl Friesen'  
Cc: Kalawaianui Hosaka

You replied to this message on 11/20/2020 1:15 PM.

On Nov 19, 2020, at 3:30 PM, Tim O'Connell <tim.oconnell@clima-tech.com> wrote:

Karl,

If we are still discussing the Woodburn Library some (a quantity of eight) of the wall sensors installed at the site already have the override button feature. See the attached as-built sheet 11. Typically they are configured to provide a pre-determined over-ride duration (up to 3 hours, adjustable) and trigger the AHU/plant to run as well. We may need to look into the programming to verify that sequence but the hardware is already in place.

Please let me know if you have any questions.

Thank You,

Tim O'Connell  
Estimating/Sales  
(503) 710-2420 cell

<image002.png>

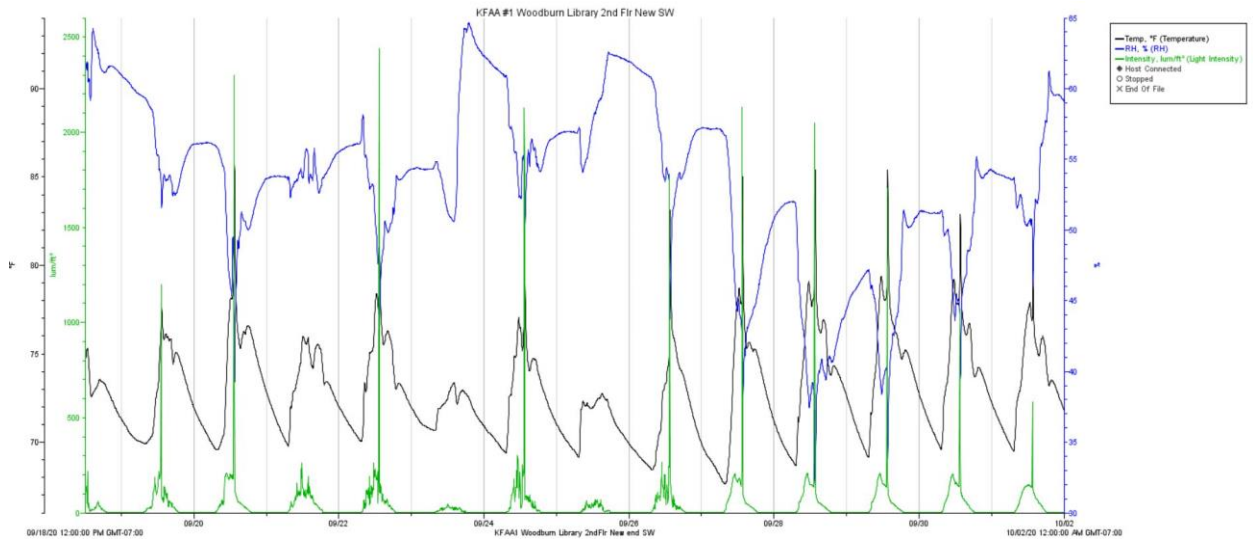
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**From:** Karl Friesen <karl@karlfriesen.com>  
**Sent:** Thursday, November 19, 2020 1:58 PM  
**To:** Tim O'Connell <tim.oconnell@clima-tech.com>  
**Subject:** [EXTERNAL]If you can, .....

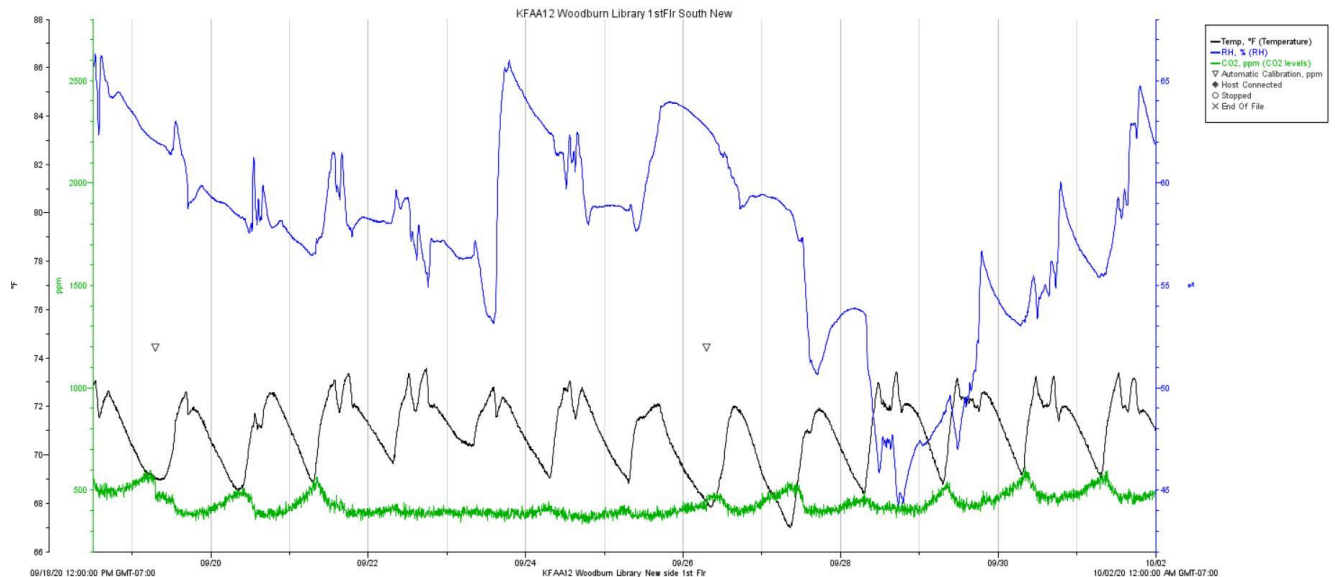
If you can could you send me a cost to had an override switch into the Woodburn building. Including programming to switch the system over to occupied mode from unoccupied mode if they need to use the building after the hours established for unoccupied.

Reply Reply All Forward  
Fri 11/20/20

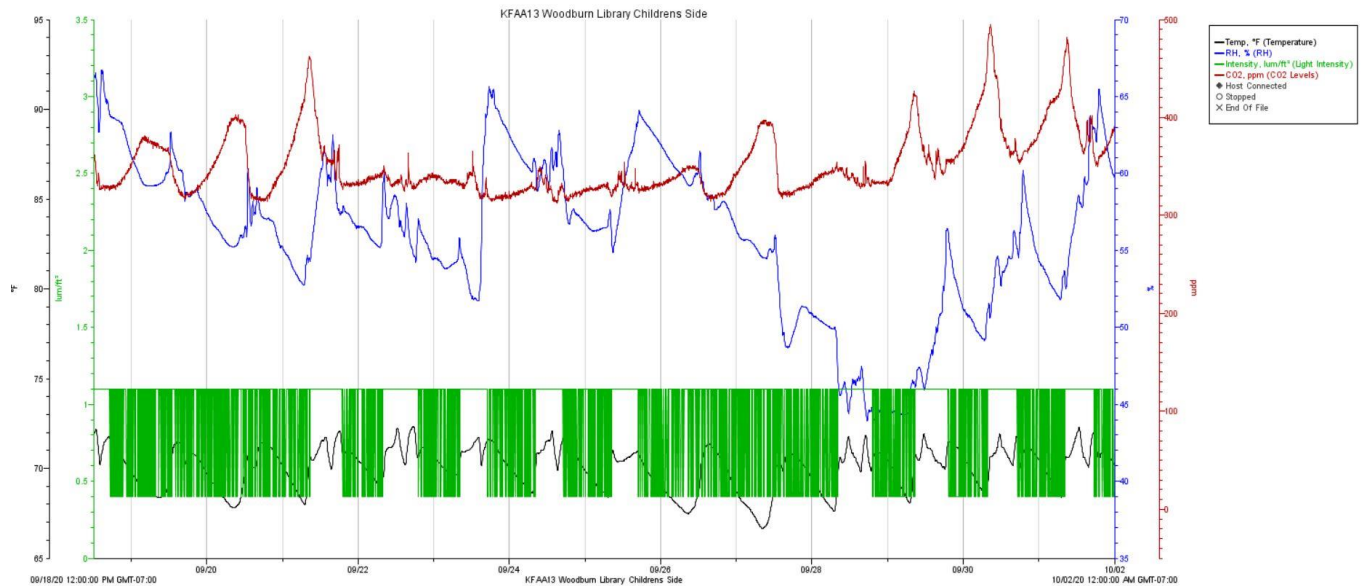
## Appendix H - Data Logging Results



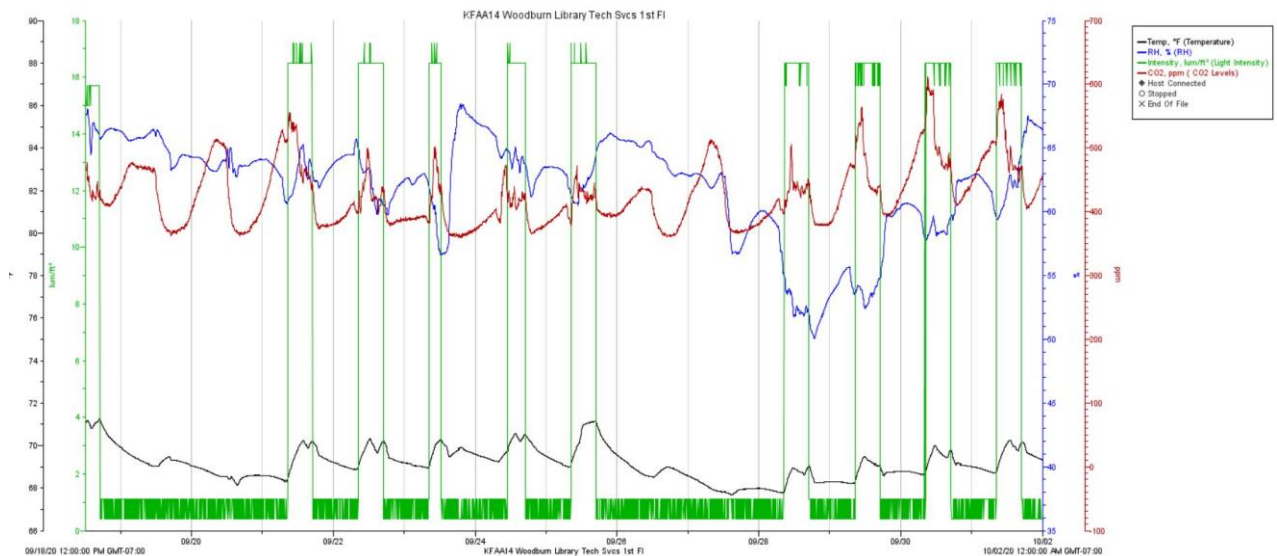
Southwest 2<sup>nd</sup> Floor: The temperature fluctuates around 69°F and 76°F on all days of the week indicate there are moderate setbacks during unoccupied hours. The sudden temperature rises at 2-3 am indicates some sort of HVAC startup/operation which continues operating till after 11 pm-12 am. The high peaks in the light levels indicate solar gain. RH levels are independent of the temperature indicating the space has excessive outdoor air.



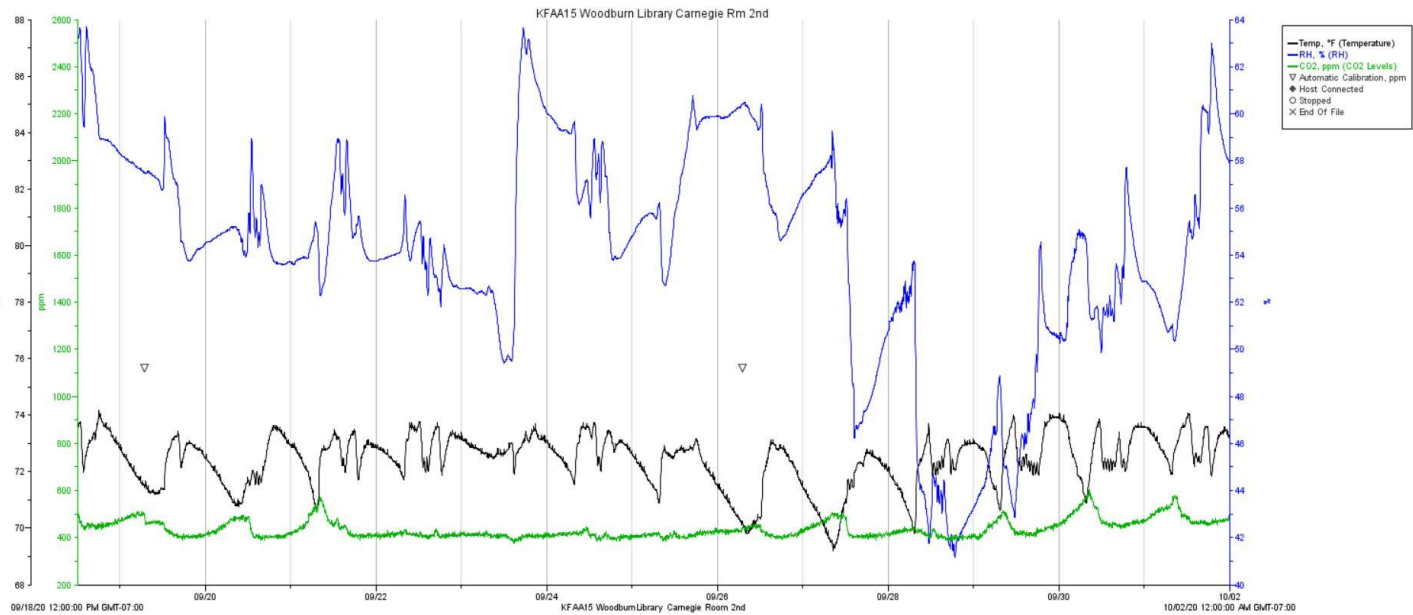
1<sup>st</sup> Floor SW: Temperatures oscillate between 68°F-73°F for all days of the week indicating little temperature setback during after hours. Lack of direct linkage between RH and temperature indicates excess outside air is being supplied. CO2 levels are averaging around 500-600 ppm also indicating excessive outside air.



Children's side library: Occupied temperatures vary between 69°F-72°F most weekdays and go as low as 67°F during weekends indicating only moderate temperature setback after hours. CO2 levels average at 400 ppm with small peaks of 500 ppm due to sudden change in occupancy or outside air damper position, however, these levels are still low, indicating excessive outside air.



Tech Services 1<sup>st</sup> floor: Temperature fluctuates between 69-71°F on weekdays with weekends floating around 68°F indicating only moderate setback control. CO2 levels are in the range of 400 – 600 ppm during occupied hours with very few peaks of 600 ppm. This indicates an excessive amount of outdoor air is being supplied to space. Lighting follows a consistent occupied schedule and shutoff during weekends and nighttime.



Carnegie Rm 2<sup>nd</sup> floor: Temperature fluctuates from around 71°F to 74°F during weekdays, dropping to 68-69°F during weekends indicating only a moderate setback has been implemented. CO2 levels average around 400 ppm at all times of the day indicating low occupancy and excessive outdoor air supply.

## **Appendix I - Site Photos**



*Figure 1: West Façade – Carnegie Library*



*Figure 2: East Façade – Carnegie Library*



*Figure 3: West Façade – Carnegie Library*



*Figure 4: Connection Point Between Carnegie Library & New Library*



*Figure 5: New Library – NE Facade*



Figure 6: New Library – Eastside Courtyard



Figure 7: New Library South Facade



Figure 8: New Library – Westside at Loading Dock



Figure 9: New Library – Westside Entrance



Figure 10: Carnegie Library – Carnegie Room



Figure 11: Carnegie Library – Multi-Purpose Room



Figure 12: Carnegie Library – Basement

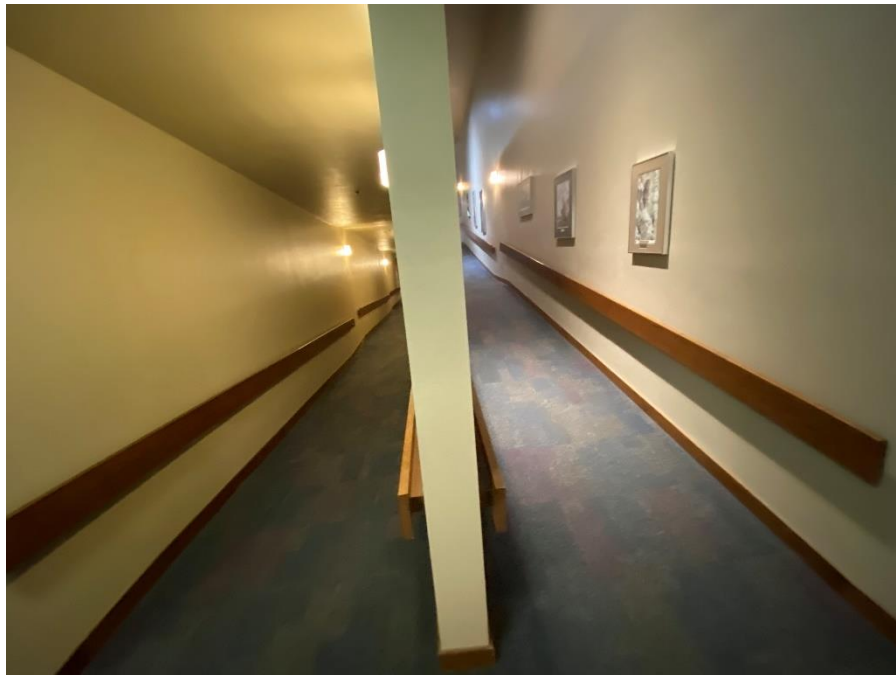


Figure 13: Carnegie Library – Connecting Corridor Between Old and New Library



Figure 14: New Library – West Entrance



Figure 15: New Library – East Entrance



Figure 16: New Library – Open Roof Atrium Reading Room



Figure 17: New Library – 1<sup>st</sup> Floor Looking South



Figure 18: New Library – 1<sup>st</sup> Floor Looking West & Up to 2<sup>nd</sup> Floor



Figure 19: New Library – Loading Dock



Figure 20: New Library – 1<sup>st</sup> Floor Looking NE



Figure 21: New Library – 1<sup>st</sup> Floor



Figure 22: New Library – 1<sup>st</sup> Floor Looking SE



Figure 23: New Library – 1<sup>st</sup> Floor South end

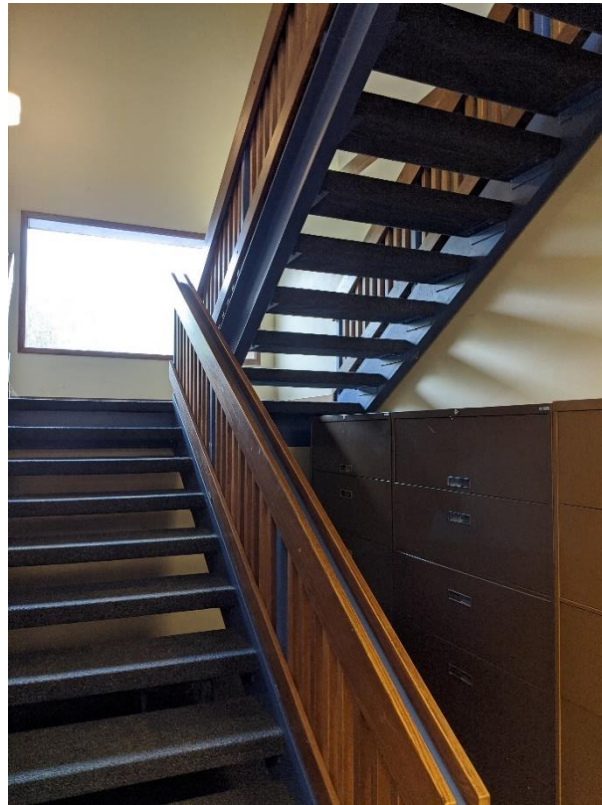


Figure 24: New Library – 1<sup>st</sup> Floor at Stairs



Figure 25: New Library – 2<sup>nd</sup> Floor at Elevator



Figure 26: New Library – 2<sup>nd</sup> Floor Looking South



Figure 27: New Library – 2<sup>nd</sup> Floor



Figure 28: SF-1 & CC-1 - New Library Mechanical Room



Figure 29: Fan VFD

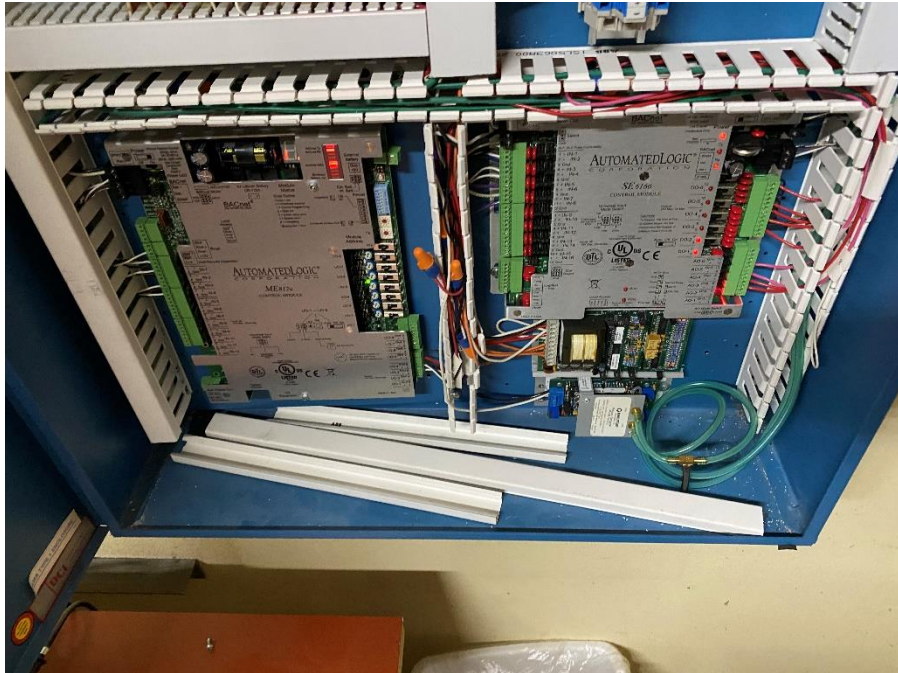


Figure 30: Automated Logic controls in Mechanical Room



Figure 31: Chilled Water Pump (P-1) - New Library Mechanical Room



Figure 32: Return Fan (RF-1) New Library Mechanical Room



Figure 33: Chiller (CH-1) – Outside of Mechanical Room Entrance